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A MANUAL
OF
PRACTICAL OBSTETRICS.

DAVIS.

PRESS NOTICES

OF THE

FIRST EDITION OF DAVIS' OBSTETRICS.

From the "Medical News," Philadelphia.

"Books upon obstetrics have so largely multiplied that one may reasonably doubt if any immediate necessity existed for additions to the number. Good books, however, are always welcome, and will be given cordial reception. In this class belongs the Manual of Dr. Davis, of which it is to be said that, though concise, it is clear in expression and accurate in statement. Within narrow limits a great range of subjects has been discussed with admirable skill and precision. The text makes easy and agreeable reading. The utility of the work is greatly enhanced by a large number of excellent illustrations. The book may be cordially recommended to those who do not desire to use the larger and more voluminous works on obstetrics."

From the "Medical Record," New York.

"This Manual is, unlike many of its class, not a mere compilation, but contains a number of practical hints not usually found in larger works. The chapters on the diagnosis of pregnancy, the treatment of normal and premature labor, operative obstetrics, the puerperal state, and post-partum hemorrhage commend themselves especially by their clearness and conciseness. We are glad to see that the writer is a believer in episiotomy, and find on page 94 the only intelligent description of that useful operation which we remember having read. If the advice given in Chapter VI, on the examination of patients before the beginning of labor, were generally followed there would be an immense difference in the maternal and fetal mortality."

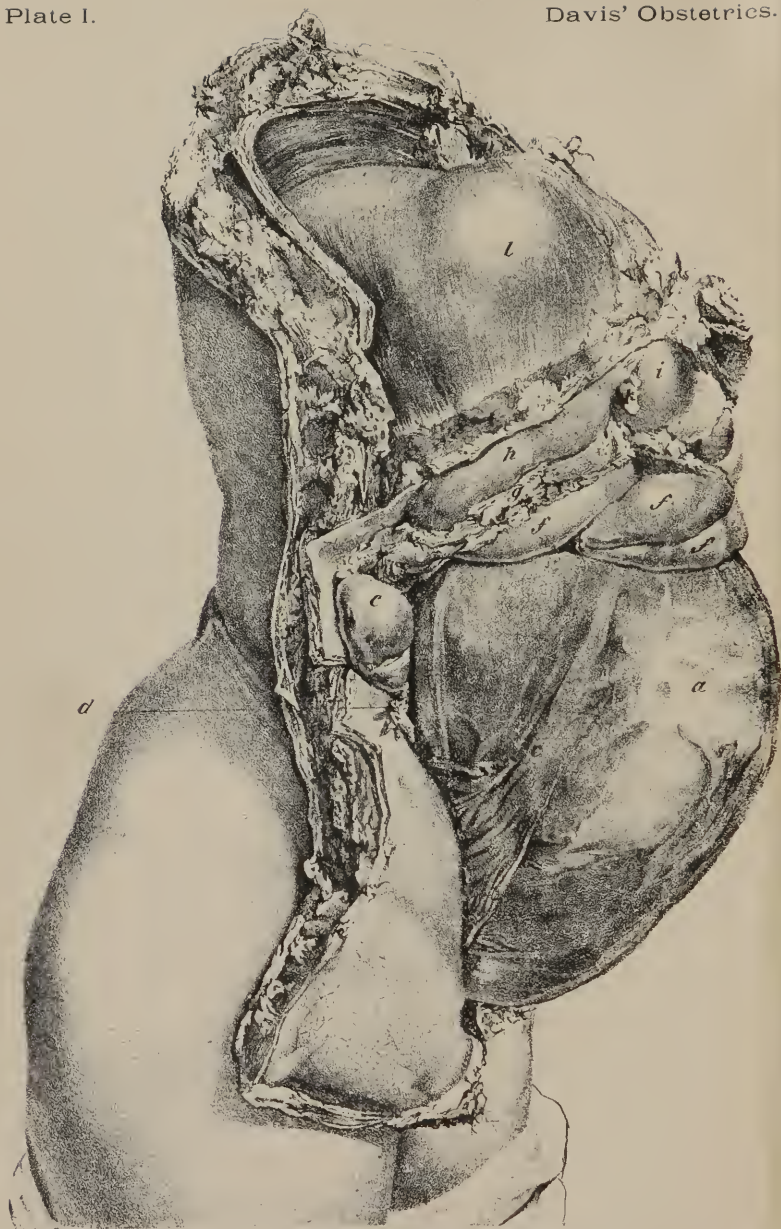
From the "Therapeutic Gazette."

"This work seems to us to fill a much-felt want—that of a small but good work on obstetrics, well illustrated, and certainly all that the student is likely to need. The illustrations are all good, large, and complete. The text is plain and yet full enough, and the whole book is very satisfactory. It is not a primer or a compendium exactly, but a small obstetric text-book, complete as most other works, with the padding left out. It does not tell us anything about antediluvian births, or archaic forceps, nor all the errors of the past about generation, conception, and the ovum. The student and the practitioner can get as much out of it as out of the most elaborate works in many volumes for most of his needs, and the encyclopedic works he can purchase later."

From the "American Journal of Obstetrics," New York.

"A concise and well digested statement of modern obstetrics as taught by the more prominent contemporary authorities, guiding his choice of methods by his own experience. The plates and illustrations, which are well chosen, are taken from the various works used in the preparation of the text."

P. BLAKISTON, SON & CO., PHILADELPHIA.

THE ABDOMEN AT TERM. (*Martin.*)

Side view of Abdominal Cavity laid open after partial removal of the large omentum in a woman far advanced in pregnancy (one-third life size). *a*, uterus at term, *b*, right round ligament; *c*, right oviduct; *d*, fimbriae of the right oviduct; *e*, ascending colon; *fff*, coils of intestine; *g*, large intestine; *h*, right lobe of liver; *i*, left lobe of liver; *k*, round ligament of liver, cut through; *l*, diaphragm covered with the pleura.

A MANUAL
OF
PRACTICAL OBSTETRICS

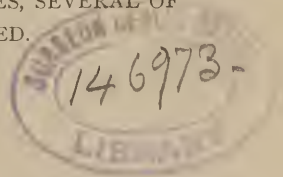
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HOSPITAL; MEMBER OF THE AMERICAN GYNECOLOGICAL SOCIETY.

Second Edition, Revised and Enlarged.

WITH ONE HUNDRED AND THIRTY-FOUR ILLUSTRATIONS
AND SIXTEEN FULL-PAGE PLATES, SEVERAL OF
WHICH ARE COLORED.



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PREFACE.

The preparation of this book has been suggested by the needs experienced in teaching students of medicine. The development of post-graduate instruction and the establishment of obstetrics as a Senior Study in medical colleges have relieved obstetric study from the details of anatomy and physiology memorized by the student in his earlier years. Whether he be an under-graduate in a medical college, or a practitioner, he desires to know the reasons for scientific facts, and the practical deductions which their consideration suggests. As an aid in such study, a concise statement is here given of modern practical obstetrics as taught in many Continental and American Schools of Obstetrics.

In preparing the second edition of this Manual, the book has been thoroughly revised, an account of symphyseotomy and its results has been added, and also additional facts in connection with the practice of palpation and the diagnosis of positions. A number of additional illustrations have been incorporated, including a series based upon original photographs taken under the supervision of the author.

Personal experience has guided the choice of methods of treatment commended. It is hoped that the work in its revised, enlarged, and improved form will continue to merit the favor with which its first edition was received.

*250 S. 21st St., Philadelphia.
January, 1894.*

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MANUAL OF PRACTICAL OBSTETRICS.

CHAPTER I.

OVULATION; MENSTRUATION; CONCEPTION; THE OVUM.

By Ovulation is understood the formation in the ovaries and discharge from those organs of the ova or eggs, from which the human being, in common with other mammals, is produced. This process does not occur at regular intervals, but goes on almost constantly from the establishment of puberty to the menopause, and even later. Menstruation is a discharge of blood and epithelial elements from the endometrium which occurs at intervals, usually twenty-eight days each, but frequently is intermitted.

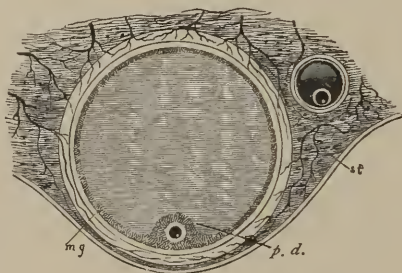
The relation between ovulation and menstruation may be expressed by the statement that a woman may ovulate without menstruation, but she will rarely menstruate without ovulation.

The discharge of blood occurring after removal of the ovaries, or operations upon the pelvic organs, is not menstruation, but uterine hemorrhage, as it is not caused by the exfoliation of the endometrium, and does not contain the cellular elements of the menstrual fluid.

Pregnancy causes menstruation to cease, as may also any

cause which disturbs the general health, while ovulation may continue and a second conception occur prior to the formation of the decidual membrane in the first fecundated ovum; conception may also take place during the temporary cessations of menstruation which follow change of climate or great alteration in a patient's environments. Conception is the union of the male and female elements, the joining of the spermatozoid of the male semen with the female ovum. When the woman's body contains this united element she is pregnant. To understand this condition, known as preg-

FIG. 1.



TWO GRAAFIAN FOLLICLES.

m. g. Membrana granulosa. *s. t.* Ovarian stroma. *p. d.* Proligerous disc.

nancy, the anatomy of the ovum, the manner of its discharge from the ovary, and the site and mode of impregnation must be considered (Fig. 1).

The ovaries contain the ova in ovisacs, called from their discoverer Graafian follicles. The capsule of a follicle is lined by round nucleated cells named the granular membrane (Membrana Granulosa). At some portion of the wall of the follicle these cells accumulate, forming the proligerous disc in which is found the ovum. This little body, $\frac{1}{120}$ of an inch in diameter, is composed of a yelk membrane (the

vitelline membrane), a yelk (the vitellus), a transparent vesicle (the germinal vesicle), in the center of which is the germinal spot; the germinal vesicle measures $\frac{1}{700}$ of an inch in diameter; the germinal spot $\frac{1}{3000}$, about the size of a red blood corpuscle (Fig. 2).

The ova are discharged from the ovaries by rupture of the ovisacs, and pass thence through the oviducts to the uterus; or, meeting the spermatozooids, may remain and develop in some portion of the duct of the ovary. These ducts, called the Fallopian tubes, are sufficiently large to permit the passage of ova, spermatozooids, and the secretion of the membrane lining the ducts. They terminate at the upper corners of the uterus, passing obliquely through the muscular wall to open upon the endometrium. At their ovarian extremities they expand into the pavilions, slightly concave dilatations lined with ciliated mucous membrane; the margins of the pavilions are fissured by irregular fringe-like projections called fimbriæ; one of these is attached to the ovary, forming the tubo-ovarian ligament, and anchoring the tube to the ovary. The oviducts, or Fallopian tubes, are four or five inches long, from $\frac{1}{6}$ to $\frac{1}{4}$ inch in diameter, and are composed of a peritoneal, muscular, and mucous coat, the last having epithelium whose ciliæ move from the ovary toward the uterus. This mucous membrane is capable of nourishing by its secretion an impregnated ovum in its first days of life.

The male element essential to reproduction is the spermatozoid, an albuminous cell from $\frac{1}{500}$ to $\frac{1}{625}$ of an inch in length, consisting of a head, tail, and intermediate segment. Spermatozooids are endowed with motion sufficiently rapid to enable them to pass from the vagina to the oviducts in a few moments. Their vitality persists when in alkaline media for 24 or 30

FIG. 2.



HUMAN OVUM.

1. Germinal vesicle.
2. Yelk.

hours; they are rendered motionless by cold and killed by acids.

Impregnation, the joining of ovum and spermatozoid, may occur in any portion of the genital tract from the uterus to the ovary. It probably happens most frequently at the pavilion of the oviduct; when the impregnated ovum lodges in the uterus it is an entopic, intra-uterine normal pregnancy; when the impregnated ovum is retained outside the cavity of the uterus, it is an extra-uterine or ectopic pregnancy, which is abnormal. It should be remembered that the genital tract, from the cervix uteri to the pavilion of the oviduct, is essentially one musculo-membranous tube, whose epithelial lining membrane, in any portion of its extent, may receive and nourish the impregnated ovum in the early stages of its development, and whose muscular tissue finally expels the ovum at maturity. In normal pregnancy the fecundated ovum is soon passed onward into the uterus, whose muscular walls are especially fitted to expel a body of considerable size, like a fetus at term, and overcome a marked resistance.

It will be necessary next to consider the changes which occur in the ovum after fecundation, and also the accompanying modifications in the genital tract and in the general organism of the mother during the growth of the ovum to maturity.

Before the contact of the spermatozoid, the germinal vesicle of the ovum moves toward the periphery and from the vesicle projects one or more cells or globules, called polar globules, whose function in the production of the new being is unknown. The portion of the germinal vesicle remaining after the formation of the polar cells is known as the female pronucleus. The spermatozoid, penetrating the yolk or vitellus, loses its tail and intermediate portion, and the head forms the male pronucleus. After the entrance of one spermatozoid others are excluded by the formation of the vitelline or yolk

membrane, thus rendering the production of monsters in normal cases impossible, by preventing the joining of more than one spermatozoid with the ovum.

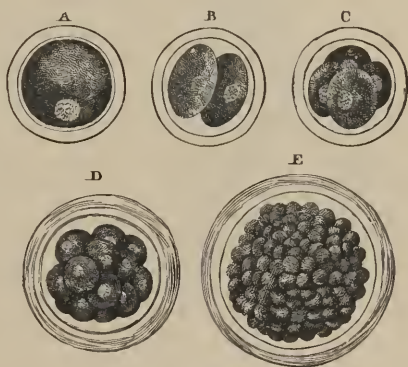
Both male and female pronuclei approach each other, joining in a nucleus, and segmentation or cleavage occurs. This begins in the nucleus which has been formed by the union of the ovum and spermatozoid; the yelk, or vitelline mass which surrounds it, shares in the process, so that a portion of the yelk accompanies each of the first two nuclei formed by the division.

This process is continued until the ovum has become a mass of minute spheres, the whole resembling a mulberry, and called the muriform, or mulberry-like body (Fig. 3). These spheres are of various sizes; the larger and more transparent compose the epiblast, or upper germs; the smaller the hypoblast, or under germs.

The hypoblast remains in the center of the ovum, while the epiblast surrounds it. The ovum, at this stage, is five or six days old, and usually passes from the oviduct to the uterus, where it lodges in an infolding of the endometrium, which undergoes various important modifications, fitting it to retain and nourish the embryo.

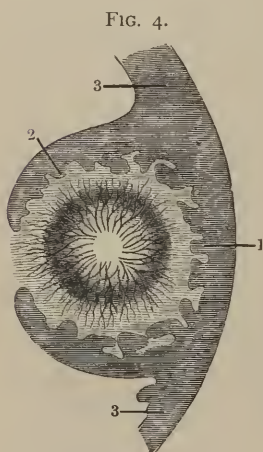
The membranes which envelope the ovum are known as deciduous, and are, in the early stages of development, three in

FIG. 3.



E. THE MURIFORM BODY.

number. The first is the lining membrane of the uterus, on which the ovum rests, formerly called *Decidua Serotina*, now called *Placental Decidua* (1, Fig. 4) because it enters into the formation of the placenta. The lining decidua of the uterus gradually extends over the ovum, finally covering it; this investing portion is called the *Decidua Reflexa*, or *Ovular Decidua* (2, Fig. 4). The third deciduous membrane covers the interior of the uterus, and is the *Decidua Vera*, or *Uterine Decidua* (3, Fig. 4).



THE DECIDUOUS MEMBRANES.

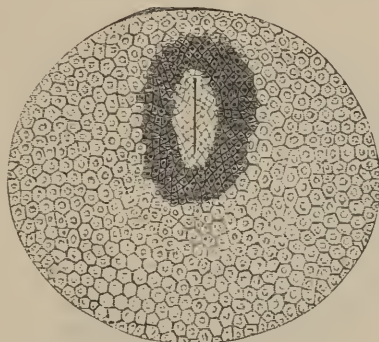
Returning to the ovum, we find that after the formation of the mulberry, or muriform body, a fissure appears between the epiblast and hypoblast, which separates them in such a manner as to form a vesicle inside the vitelline membrane, whose wall is formed by epiblast cells, with the hypoblast cells accumulated on a part of its internal surface; this vesicle is the blastodermic vesicle. It grows rapidly, the hypoblast flattening and extending within the epiblast.

A third layer of cells is now formed, probably from the two others, called the mesoblast. From these layers are developed the various tissues and organs of the fetus, as follows: from the epiblast are formed the nervous system and parts of the organs of the special senses; from the hypoblast are formed the epithelium of the digestive and respiratory tract, the cylindrical epithelium of the liver ducts, the pancreas, thyroid gland and glands of the alimentary canal, and the hepatic and pancreatic parenchyma. From the mesoblast are derived the muscles, bones, connective

tissue, arteries, veins, lymphatics, and capillaries, with the urinary and generative organs (Fig. 5).

The epiblast, mesoblast, and hypoblast unite in forming an embryonic area, or Area Germinativa, which is oval in shape ;

FIG. 5.



THE EMBRYONIC AREA AND AXIAL GROOVE.

in the center of this body there appears a groove called the axial or medullary groove, which becomes enclosed by folds from either side, forming a closed tube, the neural canal.

CHAPTER II.

THE EMBRYO.

The embryo now begins to take shape, and resembles rudely a boat with extremities of unequal size. The larger is the cephalic, the smaller the caudal extremity (Figs. 6 and 7).

The folding in of the blastodermic vesicle, which results in this boat shape, destroys its spherical form, and it becomes

FIG. 6.



EMBRYO, SEVEN OR EIGHT WEEKS OLD.

constricted into two parts, the smaller being embryonic, the larger forming the yelk membrane, or umbilical vesicle, which nourishes the embryo.

The embryo has not only the membranes derived from the uterus, but others which surround it, formed in the process of its own development. These are two in number, the amnion and chorion. The amnion begins in folds given off by the mesoblast and epiblast, finally joining to form a complete sac.

As the embryo grows, the yelk sac, or umbilical vesicle, gradually disappears, and another forms in its place, the allantois, so called because it resembles a sausage. This in turn becomes constricted, and forms an outside and inside portion, that remaining within the body of the embryo forming the urinary bladder; that projecting without forms an umbrella-like expansion which, with layers from the mesoblast and epiblast, constitute the second of the fetal membranes proper, the chorion. As growth proceeds, the blood-vessels of the allantois become so extensive as to form a part of the abundant circulation of the villi of the chorion. The allantoid sac contains an albuminous fluid, but its chief function is that of bringing blood-vessels to the portion of the chorion forming the placenta.



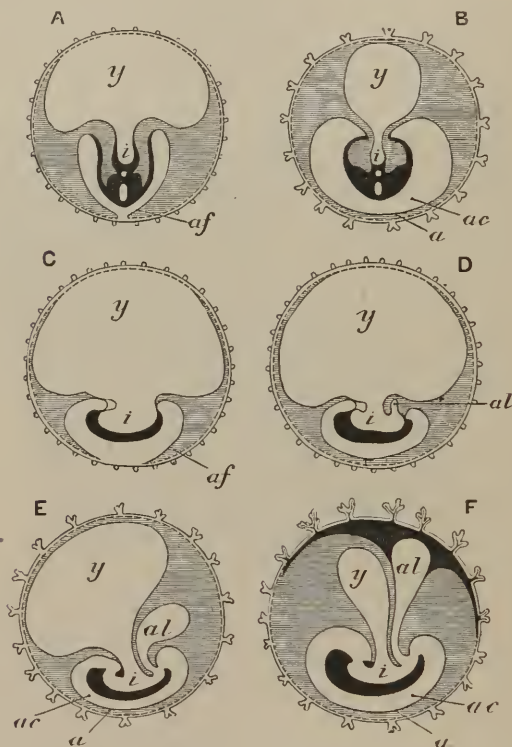
FIG. 7.
OVUM SIX WEEKS OLD,
In the ovular decidua showing three openings.

As the embryo grows the amnion forms two layers, the external of which joins the vitelline membrane, and the internal of which covers the fetal surface of the placenta and also the umbilical cord (Fig. 8).

Through the medium of the amnion, and as a transudation from the embryo, is formed the amniotic fluid, or liquor amnii. This is generally yellowish, opalescent in color, faintly alkaline, with a specific gravity from 1002 to 1015. It contains from 1 to 1.5 per cent. of solids, which are chlorids, phosphates, sulphates, and lactates of sodium, potassium, and

calcium, creatin and creatinin, albumin and mucosin, and urea. The weight of the amnial liquid is greater than that of the fetus during the first half of pregnancy, but after that

FIG. 8.



THE AMNION AND ALLANTOIS.

A, B. Transverse sections of the Embryo. *C, D, E, F.* Longitudinal sections. *af.* Amnial fluid. *i.* Alimentary canal. *y.* Yolk sac, or umbilical vesicle. *a.* The Amnion. *ac.* Amnial cavity. *al.* Allantois. The embryo is back downward.

period the fetus outweighs this fluid. Its color varies to a dark reddish-brown in women who work in tobacco, and in

cases where the contents of the fetal intestine have been expressed into the amniotic sac. This fluid is derived from the fetus and from the maternal blood-vessels and those of the umbilical cord and placenta. The amniotic fluid serves as an elastic buffer to protect the fetus from violence, as a dilator during labor, protecting the cord from pressure, and also aiding in some degree in nourishing the fetus. It renders fetal movements easy, and thus assists in the development of the fetus, as illustrated by deformities resulting in fetal limbs when the fluid is deficient.

FIG. 9.



VILLI OF CHORION (low power).

FIG. 10.



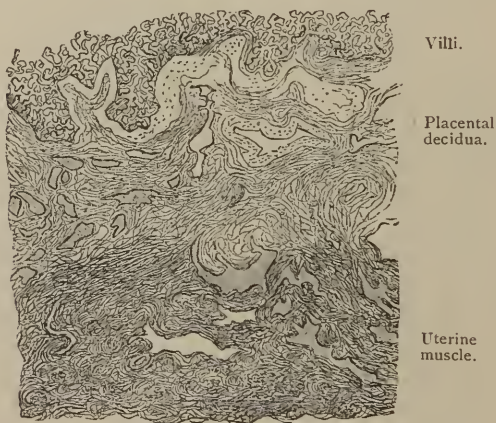
VILLI (330 diameters).

Between the amnion and decidua the chorion is developed ; it is derived from the vitelline membrane, or *Zona Pellucida*, which is at first a smooth membrane (Fig. 9). About the second week of pregnancy this smooth membrane becomes covered by tufts called villi ; they are at first solid. About the fourth week blood-vessels begin to penetrate the villi, and the chorion becomes complete by the joining of the allantoïd and an intermediate layer of the epiblast. The

general hypertrophy of the villi which follows causes the ovum to resemble a chestnut burr whose projections are delicate and vascular. At the third month, the villi over the larger free surface of the ovum atrophy and disappear, while the villi at the attachment of the ovum to the uterine wall, at the placental decidua, become larger and more branched; the development of these villi and that of the placental decidua forms the placenta (Figs. 10 and 11).

This body is distinct first at the third month, being com-

FIG. 11.

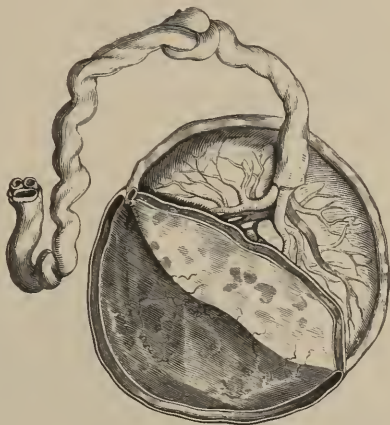


PLACENTAL VILLI AND DECIDUA.

plete at the beginning of the fourth, or sixteen weeks of pregnancy. It is known as the "after-birth or mother-cake," and is a fleshy, flattened mass, usually six to eight inches in diameter, and varying in thickness from over an inch to one-fifth, being thickest where the cord is inserted. Its usual weight is eighteen ounces, but it varies with the weight of the child. The average weight of the placenta to that of the child is one-third from the seventeenth to the thirty-second

week. Between the thirty-second and thirty-third week the placenta attains its acme of weight, and remains from one-third to one-fifth the weight of the child, unless influenced by derangements of the fetal circulation, until birth at the fortieth week. After the fortieth week the placenta seems to grow rapidly in multiparæ, or with women having large children, thus raising the average from one-fifth to one-fourth. The external or uterine surface is dark red, divided into many areas by fissures, and covered by a delicate grayish membrane, the placental decidua. The internal, fetal surface is smooth, a little depressed, yellowish in color, and formed of the chorion and amnion (Fig. 12).

FIG. 12.



PLACENTA, MEMBRANES (stripped upward).

The placenta is usually surrounded by a large vein, the circular sinus at its margin. It may be divided into many lobes of irregular shapes. The point of attachment of the placenta is usually in the upper portion of the uterus, either anteriorly or posteriorly.

Examination of the circulation of the placenta shows that the enlarged blood-vessels of the decidua gradually lose their walls until only the endothelial cells of the lining membrane remain, forming large sinuses which empty themselves partly through separate veins, and partly through the large vein or sinus at the border of the placenta, which communicates with

the sinuses in the muscular tissue of the uterus; this may be termed the uterine portion of the placental blood system (Fig. 13).

The fetal blood system consists of the villi and their vessels. The longer villi fit loosely into the decidual sinuses as a finger may be inserted into a glove too large for it. The shorter villi terminate in the superficial cellular strata of the decidua.

FIG. 13.



PLACENTAL AND UTERINE VESSELS.

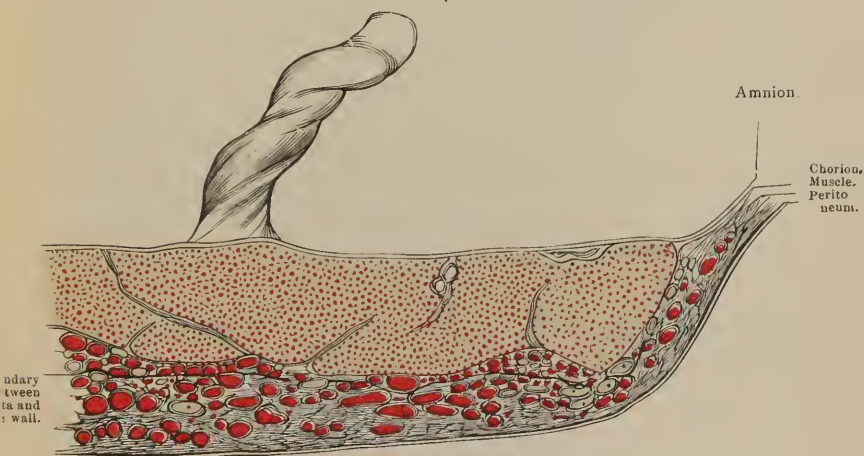
a. Umbilical cord. *b, b.* Section of Uterus. *c, c, c.* Umbilical vessels.
d, d. Curling arteries of uterus.

It is quite possible to prove by the injection of different colored fluids into the uterus and placenta that the blood-vessels of each do not directly communicate, as is illustrated by the accompanying (Fig. 14).

It is very common to find lime salts deposited in normal

placentæ of children born at term, forming grayish masses which can be readily felt by the finger, imbedded in the placental tissue. The areas into which the uterine surface of the placenta is divided are called cotyledons ; a placenta which has several supernumerary cotyledons connected with the principal mass is called placenta succenturiata. The relation between the membranes and the wall of the uterus at term may be well shown by the accompanying (Fig. 15). It must

FIG. 14.



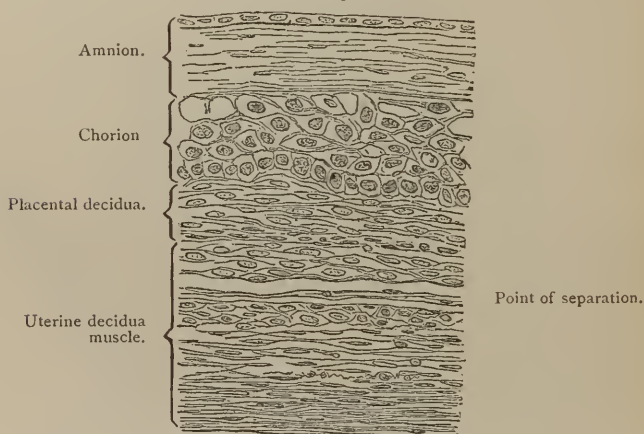
THE PLACENTA AND UTERUS (injected while adherent).

be remembered that the chorion itself has neither vessels nor nerves ; the villi grow only at those points where the vessels of the allantois pass into them to protrude, within the villi, into the endothelial sinuses of the decidua. The villi bud and subdivide luxuriantly in the decidua, often containing a capillary loop of allantoic vessels.

The placenta and fetus are connected by the umbilical cord, which consists of blood-vessels enclosed in a sheath of

embryonal connective tissue known as Wharton's jelly. In ligating the cord after the birth of the child, this jelly may be pressed out from the stump of cord left upon the fetus by grasping the stump with the thumb and index finger of one hand close to the umbilicus, pressure being made against the child's abdomen to prevent traction upon the umbilicus. With the thumb and fingers of the other hand the cord may be grasped and the jelly pressed out by traction away from the child's body. The blood-vessels are three in number, two

FIG. 15.



THE MEMBRANES. (Section through uterine wall.)

arteries and one vein, which is one-sixth longer than the arteries. The arteries have especially strong walls, and although they twist in a spiral they very rarely become dilated into varicosities; the vein is large, with a thin wall and without valves. It comes from the placenta, and winding about the arteries passes to the fetal liver. Pressure in the vein is greater than that in the arteries; the result is a twist usually from right to left in the cord. These spirals vary

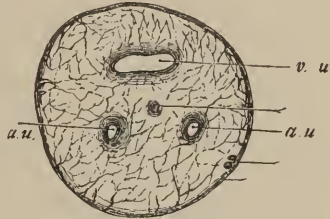
greatly in number, from none to forty or more, and form gradually early in pregnancy, when the fetus is freely movable and can follow the twisting of the cord. Later the fetus is too large and heavy to rotate evenly, and the cord may then coil about some portion of the fetus or open loops remain (Fig. 16).

Lumps of Wharton's jelly which form along the cord are called nodes. In two-thirds of all cases the cord is inserted in the placenta between the center and the margin: in one-fifth of the

cases it is inserted in the center, less often in the margin. When the umbilical vessels pass between the membranes to be inserted in the placenta it is called a velamentous insertion.

The cord is derived from the allantois with the umbilical vessels and the vitelline vessels. With Wharton's jelly as a padding or mould, its covering is the amnion. It is, at term, usually a little longer than the fetus, over twenty inches: it is as thick as a man's little finger.

FIG. 16.



CROSS SECTION OF CORD.

v. u. Umbilical vein. *a. u.* Umbilical arteries.

CHAPTER III.

THE FETUS AND ITS PHYSIOLOGY.

The term embryo is usually applied to the young being before the perfect formation of the placenta at the fourth month ; after this period it is known as the fetus. While the subject of embryology requires separate consideration, the practical interest of the obstetrician is concerned so far as the recognition of the probable stage of development reached by an embryo prematurely expelled, and the mode of production of the most frequent deformities.

During the first month the dorsal plates enclose the central neural canal in which are found the rudiments of the nervous system. The heart begins to beat at the third week, and the cavities of the body are formed at the end of the fourth week, the ovum being as large as a pigeon's egg, the embryo half an inch long. During the second month the face, head, and ears develop, and harelip and cleft palate may result from failure of union in the bones of the face and head. The eyes appear like black spots, the kidneys are formed, the fingers and toes are webbed, the ovum is as large as a hen's egg, the embryo an inch long, weighing one drachm ; the cord is over an inch long.

At three months ossification begins, spina bifida resulting from failure of ossification in the lumbar vertebræ. At the fourth month the fetus is six or seven inches long, the genital organs are distinctly developed, down (lanugo) forms on the skin, meconium is in the intestine, the limbs move. Such a

fetus may show heart-beats for some hours after birth ; but no respiratory movements occur.

When five months advanced, the fetus is ten inches long, the cord being twelve inches in length, hair is fully formed, and vernix caseosa is present. The fetal heart can generally be heard, and the mother usually appreciates fetal movements. At six months the fetus weighs a little over a pound, and presents many of the appearances characteristic of a full-term fetus. It may live several days, but dies chiefly because the lungs are too imperfectly developed to admit of respiration. A few cases are recorded where a fetus nearly seven months old has survived.

At seven months the fetus weighs three or four pounds, the eyelids are open, the testicles begin to descend, and the nails are almost formed. The child may live, is, in other words, viable ; but its vitality is feeble. The eighth month is marked more by increase in weight than by any new developments.

At the ninth month, or at term, the fetus is from nineteen to twenty inches long, weighing between six and seven pounds. Males exceed females slightly in weight.

There is no one positive sign that the fetus is at term. By observing the presence of a number of characteristics, the age of a fetus may be approximately estimated. Twenty inches may be taken as an average length. The body should be plump, covered by the cheesy substance called vernix caseosa, which is a secretion from the sebaceous glands of the fetal skin ; the nails should be firm, the cartilages of the nose and ear resisting, hair from one to two inches long ; the child moves and cries lustily. The cord is inserted a little below the middle of the trunk. Children weighing twenty and twenty-two pounds have been born whose parents were not monstrosities.

The following convenient table, constructed by Dührssen,

will assist in forming an idea of the rate of the fetal development :—

At the end of 1 month	1	×	1	=	1 cm.	=	$\frac{4}{9}$ inch.
At the end of 2 months	2	×	2	=	4 cm.	=	$1\frac{7}{9}$ inches.
At the end of 3 "	3	×	3	=	9 cm.	=	4 inches.
At the end of 4 "	4	×	4	=	16 cm.	=	$7\frac{1}{9}$ inches.
At the end of 5 "	5	×	5	=	25 cm.	=	$11\frac{1}{9}$ inches.
At the end of 6 "	6	×	5	=	30 cm.	=	$13\frac{2}{9}$ inches.
At the end of 7 "	7	×	5	=	35 cm.	=	$15\frac{5}{9}$ inches.
At the end of 8 "	8	×	5	=	40 cm.	=	$17\frac{7}{9}$ inches.
At the end of 9 "	9	×	5	=	45 cm.	=	20 inches.
At the end of 10 "	10	×	5	=	50 cm.	=	$22\frac{2}{9}$ inches.

To obtain the length of the fetus, multiply the month of pregnancy (1st, 2d, etc.) by a co-efficient,—1 for the first month, 2 for the second, etc., up to 5. After the fifth month the co-efficient remains 5. Thus at the seventh month the fetus is 7×5 centimeters long, 35 cm., or $15\frac{5}{9}$ inches.

The nourishment of the fetus is effected at first by the granular matter of the yolk or vitellus. It also acquires an albuminous coating in passing through the oviduct, which contributes to its nutrition ; so soon as they are formed, the first chorial villi absorb nourishment from the decidua ; the umbilical vesicle assists for a short time. The amniotic liquid probably contributes slightly to nourish the fetus, although its functions in this respect are not positively known.

The great source of fetal nourishment is the placenta ; a direct interchange of gases and fluids take place when the villi project into the mother's blood by the process known as osmosis, and this transfer of gases and solids in solution has been demonstrated by various substances which, when given to the mother, affect the fetus.

There are two fetal circulations, the first during the existence of the umbilical vesicle, the vitelline circulation ; the second, the placental circulation. In the former, the heart is a tube giving off two vessels at its superior and two at its inferior extremities. The heart's contraction forces blood

through the two superior vessels, the aortic arches, into the embryo, thence into the vitelline arteries, through which it passes into the vitellus ; it is returned by a sinus which surrounds the umbilical vesicle, and passes through the omphalomesenteric veins to the heart again.

At the beginning of the third month the placental circulation commences. The fetal heart is fitted for this circulation by two important modifications ; one is an oval opening between the auricles called the oval foramen, or Foramen Ovale, also Botall's foramen. In addition, the Eustachian valve, at the entrance of the inferior vena cava, is so formed as to turn the larger portion of blood into the left auricle, through the oval foramen, and into the left ventricle. Two additional ducts or blood-vessels are needed for the circulation, a venous and arterial duct. The former, the ductus venosus, connects the umbilical vein with the inferior vena cava ; the latter, the ductus arteriosus, joins the pulmonary artery and aorta just below the orifices of the arteries of the head and upper limbs.

The fetal circulation will be best understood if we remember that the lungs are inactive during intra-uterine life ; there is need for sufficient blood in the lungs to provide for their growth, but not for pulmonary respiration, as the fetus respire through its absorption of oxygen from the maternal blood. Starting at the placenta, we find the purified and oxygenated blood passing through the umbilical vein at the umbilicus. It will be noticed that an exception is formed to the general law that oxygenated blood is carried by arteries only. From the umbilical vein it passes through the venous duct to the inferior vena cava, where it is joined by the blood from the lower portion of the fetal body ; a little of this blood goes to the liver ; and blood from the liver is emptied into the vena cava. From the vena cava the blood passes into the right auricle, where the Eustachian valve turns the stream out of its

usual course through the oval foramen into the left auricle ; thence it goes as usual into the left ventricle.

When the heart contracts, the blood is sent from the left ventricle into the aorta, from the right ventricle into the pulmonary artery. The blood from the left ventricle goes to nourish the head and arms ; blood from the right ventricle, being needed in the lungs in small quantity only, the greater portion passes through the arterial duct into the aorta. It will be observed that venous blood is carried by the arterial duct and arterial by the venous duct, a reversal of what is usually the rule, resulting from inactivity of the fetal lungs. The aorta finally contains mixed blood, which passes partly to the lower limbs and partly through the umbilical arteries to the placenta (Fig. 17).

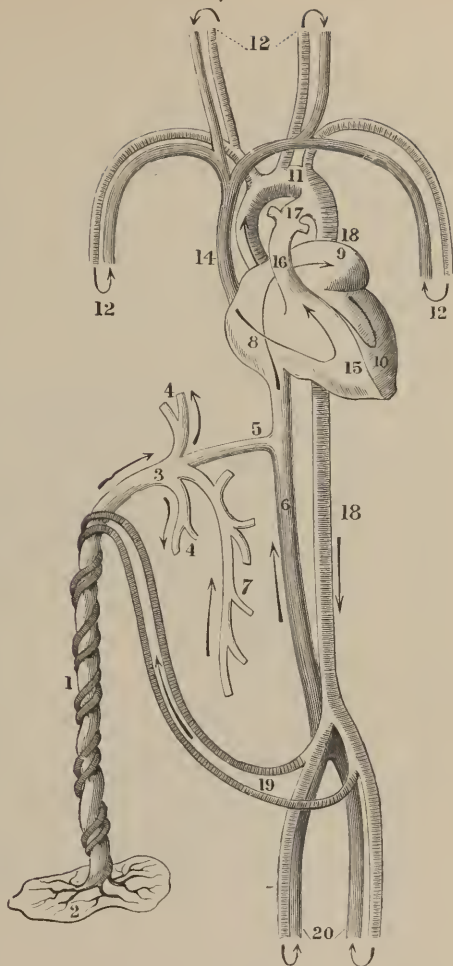
The fetal organ which receives the purest blood is the liver, because important nutritive functions are carried on in that organ. The head, arms, and trunk receive purer blood than the legs, hence their better development. As the fetus has little need for powers of locomotion, the growth of these organs comes after the development of more vital parts. Fetal respiration is accomplished by the passage of oxygen from the mother's blood to the red blood corpuscle of the fetal blood. This results from osmosis, a physical property of gases which enables them to pass through animal membranes under certain conditions which are present in the placenta.

There is abundant need for oxygen in the fetus, and its blood often contains more hemoglobin than its mother's. Whatever stops circulation in the umbilical cord kills the fetus by asphyxia. The temperature of the fetus is about one degree higher than the mother's. The metabolic changes in the fetal body while in the uterus are much slower than those in the mother's, and as it stores up oxygen it often survives for some time after its connection with the mother is cut off by separation of the placenta. The various secreting glands

FIG. 17.—Diagram of the fetal circulation.

1. The umbilical cord, consisting of the umbilical vein and two umbilical arteries proceeding from the placenta, (2). 3. The umbilical vein dividing into three branches—two (4, 4) to be distributed to the liver, and one (5) the ductus venosus, which enters the inferior vena cava (6). 7. The portal vein, returning the blood from the intestines, and uniting with the right hepatic branch. 8. The right auricle—the course of the blood is denoted by the arrow proceeding from 8 to 9. 9. The left auricle. 10. The left ventricle—the blood following the arrow to the arch of the aorta (11), to be distributed through the branches given off by the arch to the head and upper extremities; the arrows (12) represent the return of the blood from the head and upper extremities, through the jugular and subclavian veins, to the superior vena cava (14), to the right auricle (8), and in the course of the arrow through the right ventricle (15) to the pulmonary artery (16). 17. The ductus arteriosus, which appears to be a proper continuation of the pulmonary artery—the offsets at each side are the right and left pulmonary arteries cut off; the ductus arteriosus joins the descending aorta (18, 18), which divides into the common iliacs, and these into the internal iliacs, which become the umbilical arteries (19), and return the blood along the umbilical cord to the placenta, and the external iliacs (20), which are continued into the lower extremities. The arrows at the termination of these vessels mark the return of the venous blood by the veins to the inferior cava. (After Carpenter.)

FIG. 17.



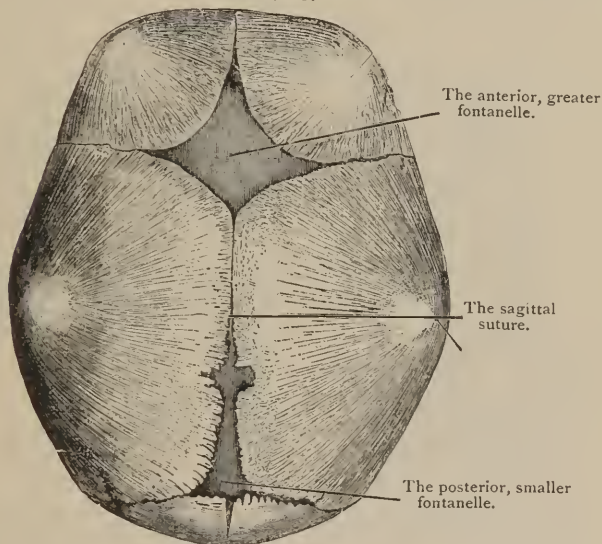
of the fetal body are formed and active at term. The great size and activity of the fetal liver is caused, not by excessive formation of bile, but by important processes in the formation of blood corpuscles which go on in that organ. Bile is formed as early as the third month, and the intestines contain meconium, a tarry substance resembling burnt molasses, composed of bile and intestinal juices, with substances swallowed from the amniotic liquid. While reflex motions have been observed on irritating a fetal limb through the uterine wall, conscious movement does not exist for some time after birth. The gustatory nerve responds to bitter substances in children born at seven and eight months.

THE FETUS AT BIRTH.—At two hundred and seventy days the human fetus measures on an average twenty inches in length, weighs from six and one-half to seven and one-half pounds, and is marked by the characteristics already mentioned. The diameters of its head will be considered in relation with those of the birth canal of the mother. The diameter of its trunk, which is of the greatest practical importance to the obstetrician, is the bis-acromial. This is measured from one acromion process to the other, and is on the average twelve centimeters, or four and three-fourths inches in extent; it is capable, however, of considerable reduction by pressure during labor, from the fact that the fetal bones possess considerable elasticity. The fetal lungs at this time are capable of inflation, while the other organs of the fetal body have already established their various functions.

THE FETAL HEAD.—The fetal head is of especial interest and importance to the obstetrician, because it is the largest portion of the fetus, and therefore is most likely to occasion difficulty in its passage through the birth canal of the mother. It is composed at birth of two parietal, two temporal and frontal, and an occipital bone, which are not yet solidly

united. The facial bones of the fetus are more nearly united at birth than are the bones of the skull, nature seeming to leave the latter imperfectly joined to favor the moulding of the head. The spaces between these bones are known as sutures; they are the sagittal or arrow suture, extending antero-posteriorly in the middle of the cranial vault; the fronto-parietal, extending at right angles to the sagittal between the frontal and the parietal bones, and the lamb-

FIG. 18.



doid, separating the two parietal bones from the occipital. Two spaces between the bones of the skull are found at the junction of the frontal and the two parietal bones, and at the junction of the two parietal with the occipital. The former, the larger, is called the anterior fontanelle and also the bregma; the latter is known as the smaller or posterior fontanelle (Fig. 18). Other fontanelles are sometimes found

between other bones of the skull. These two fontanelles are of special interest to the obstetrician because their recognition assists greatly in diagnosing the position of the fetal head during labor. The anterior or greater remains unaltered by the pressure exercised upon the head, and always admits the tip of the examining finger during labor. It is to be recognized by the fact that four bony lines or sutures extend from this fontanelle. The posterior or smaller fontanelle, on the contrary, is often obliterated by the pressure

FIG. 19.



1. The parietal eminences. 2. The lateral fontanelles.

upon the fetal head during labor, and its site is distinguishable only from the fact that three bony lines can be identified as extending from this fontanelle (Fig. 19). The recognition of the anterior and posterior fontanelle enables the obstetrician to locate the frontal and occipital regions of the head.

The diameters of the fetal head are measurements taken between certain bones by which its size is estimated. These diameters are those of length, width, and depth; there are four diameters of length, the maximum or greatest

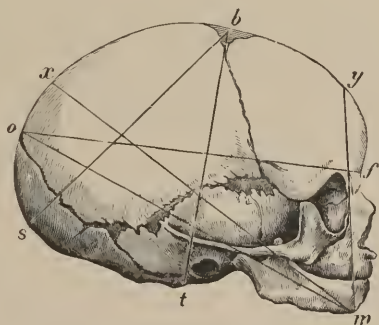
extending from the chin to a point in the sagittal suture midway between the fontanelles. It measures thirteen and a half centimeters, or five and one-third inches. The next diameter of length is the occipito-mental, measured between the point of the chin and the occipital protuberance. It is thirteen centimeters, or five and one-eighth inches. The most important diameter of length, when the mechanism of labor is concerned, is the occipito-frontal, from the root of the nose to the occipital protuberance. It measures twelve centimetres, or four and three-fourths inches; a diameter of length which is frequently substituted for the preceding in the mechanism of labor is the sub-occipito-bregmatic; it is measured from the middle of the anterior fontanelle to the under surface of the occipital protuberance, nine and a half centimeters, or three and three-fourths inches (Fig 20).

Measures in width are two in number—the bi-parietal between the protuberances of the parietal bones, nine and five-tenths centimeters, or three and three-fourths inches, and the bi-temporal, eight centimeters, or three and one-eighth inches.

The measures of depth are two in number—the fronto-mental, between the forehead and the

chin, measures eight centimeters, or three and one-eighth inches, and the trachelo-bregmatic, between the middle of the greater fontanelle and the neck in front of the larynx,

FIG. 20.



o f. Occipito-frontal diameter. *o m.* Occipito-mental diameter. *x m.* Maximum diameter. *b s.* Sub-occipito-bregmatic diameter. *t b.* Trachelo-bregmatic diameter. *y m.* Fronto-mental diameter.

nine and a half centimeters, or three and three-fourths inches.

The occipito-frontal circumference measures 34 cm. or $13\frac{1}{2}$ inches; the mento-frontal circumference is 32 cm., $12\frac{3}{4}$ inches; the occipito-bregmatic circumference is the same as the preceding. The long circumferences of the head are the occipito-mental, 36 cm., $14\frac{1}{3}$ inches, and the maximum, which corresponds to the maximum diameter, 37 cm., $14\frac{3}{4}$ inches.

CHAPTER IV.

THE BIRTH CANAL.

It will now be necessary to consider the birth canal of the mother, and to compare these measurements with those of the fetus just stated. At labor the uterus, sinking at first into the pelvis, forms an irregularly cylindrical cavity, the axis of which is the line of direction followed by a body in passing through this cavity ; the lower elastic portion of the uterus is retained in the bony pelvis during the last weeks of pregnancy and the first hours of labor, and its dimensions are practically those of the bony canal.

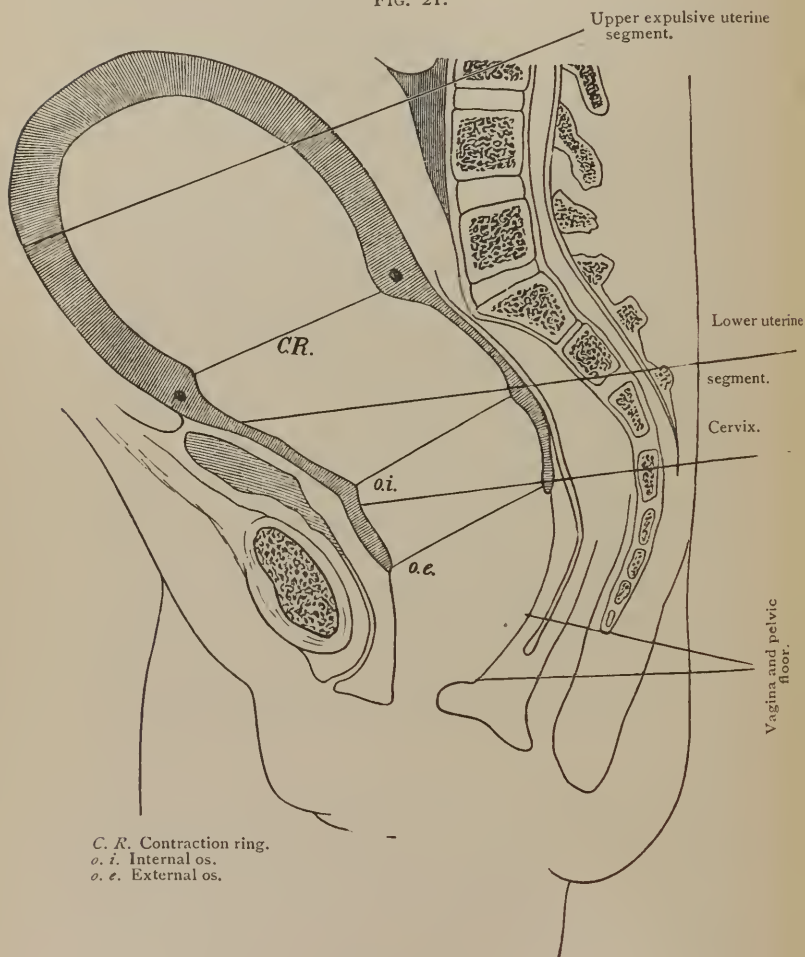
The uterus in pregnancy may be divided into three portions. The first is the expulsive, consisting of the strong interlacing muscular fibers at the fundus, which end in a border or ring. The second is the tissues between this border or ring and the internal os, known as the lower uterine segment ; while the third extends from the internal through the external os, forming the cervix. The lower uterine segment is the elastic portion of the uterus, and is composed of fibrous and muscular tissue capable of considerable distention (Fig. 21.).

Before pregnancy, it is impossible to recognize this lower segment of the uterus, and its length increases during this period till at term, when it may be demonstrated between the lower border of the upper or expulsive uterine segment, and the internal os ; the cervix retains its former length during pregnancy and labor.

In the early stages of labor, the cervix and lower uterine

segment are contained in the bony pelvis, but as labor proceeds the upper expulsive segment of the uterus contracts

FIG. 21.

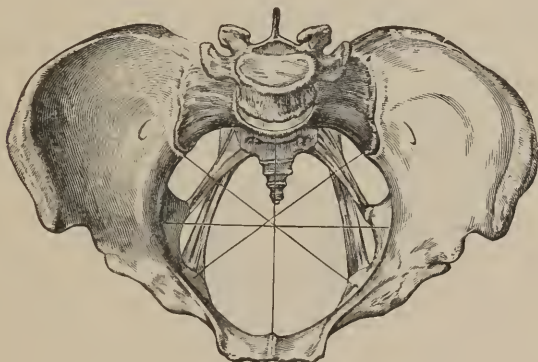


THE BIRTH CANAL.

and retracts, thus drawing the elastic or lower uterine segment just above the brim of the pelvis.

The diameters of the bony pelvis are the measurements most important in studying the mechanism of labor, and determining whether or not the normal fetus can pass through the pelvis. The most important region of the bony pelvis is the entrance or superior strait; this is also known as the pelvic brim, its measurement from the posterior surface of the pubic joint to the projection or promontory of the sacrum being eleven and one half centimeters, or four and one-half

FIG. 22.



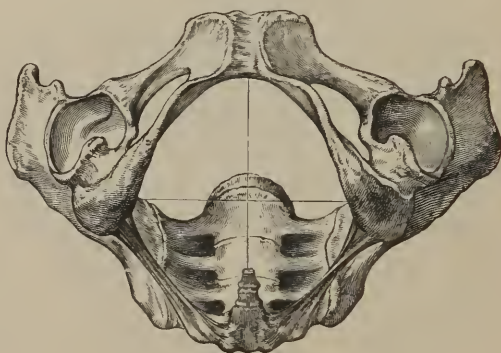
DIAMETERS OF PELVIC BRIM.

inches. This is the most important measurement in the birth canal, and is known as the true conjugate, or antero-posterior diameter of the brim.

The diagonal or oblique measurements at the brim of the pelvis extend from one sacro-iliac joint to the ilio-pectineal eminence of the opposite side; they measure twelve and one-half centimeters, or four and three-fourths inches. Transversely, from side to side, the brim of the pelvis measures thirteen and one-half centimeters, or five and one-third inches;

this last measurement is that in the bony pelvis ; in the pelvic canal of the living patient the muscular and other tissues reduce the transverse diameter, making it less than the oblique. This reduction is largely effected by the ilio-psoas muscles of each side, which may be relaxed by flexing the thighs upon the body ; hence during the first stage of labor, when delays occurs in the descent of the head into the pelvic brim, it is often advantageous to flex the patient's thighs, thus rendering these muscles relaxed and facilitating the descent of the presenting part below the brim.

FIG. 23.



PELVIC OUTLET.

The cavity of the pelvis is found to measure, on an average, twelve and one-half centimeters in diameter, or four and seven-tenths inches. This measurement is of interest because it is sufficiently great to allow the head, when perfectly flexed or perfectly extended, or the breech of the child, to rotate freely during labor. The pelvic brim having been passed, there is evidently no reason why the mechanism of labor should be impeded, so far as the dimensions of the pelvic cavity are concerned.

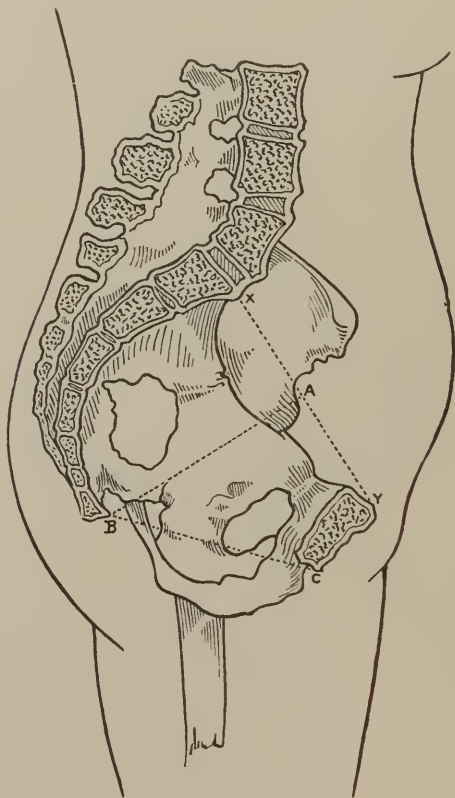
Passing to the outlet of the pelvis the average diameter is eleven centimeters, or little over four inches. The most important measurement of this region is the antero-posterior diameter, from beneath the pubic joint to the tip of the coccyx. This is increased during labor to measure from thirteen to fifteen centimeters, or from five to five and one-fourth inches. The transverse diameters of the pelvic outlet measure four and one-third inches, or eleven centimeters (Fig. 23).

The birth canal of the mother, however, is but partially described in a description of the pelvis ; but a portion of the uterus is contained in the pelvis at labor, and this important organ and also the floor of the pelvis must be considered in any study of the birth canal. It has been shown by means of frozen sections and post-mortem examinations, as well as by observations upon the living patient, that during labor the fundus of the uterus extends forward above the line of the pubic joint. The axis of the birth canal is that line which would be taken by a globular or cylindrical body moving through this canal. Such a line would extend from the fundus of the uterus downward and backward until it should meet the posterior portion of the pelvic floor ; it would then be deflected at nearly a right angle upward and forward, to emerge beneath the pubic joint (Fig. 24).

It is to be remembered that the pelvic cylinder is so formed by a combination of bony and membranous tissues that resistance and elasticity are counterbalanced, thus favoring rotation of the presenting body. During pregnancy the pelvic joints share in the general hypertrophy of this region. The pubic joint becomes specially enlarged and its mobility is greatly increased. This may become, in some cases, a source of great annoyance to the patient and may necessitate rest in bed or the application of a strong bandage. Ordinarily, however, the other joints of the pelvis, although enlarged, do not show increased mobility.

A comparison of the diameters of the fetus with those of the birth canal will serve to explain the phenomena of labor. It will be remembered that the maximum diameter of the fetal

FIG. 24.

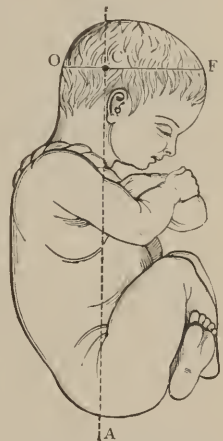


X, Y. Antero-posterior (sacro-pubic) diameter of brim. A, B, C. Composite line representing axis of birth canal.

head is greater than any diameter at the brim of the pelvis in the living patient. The same is true of the occipito-mental.

It is evident, then, that the head must enter the pelvis in its descent in such a position that neither the maximum nor the occipito-mental diameter shall be brought to present to either of the diameters of the pelvic brim. The avoidance of this occurrence results from the fact that the fetal head is placed upon the trunk as a lever upon its fulcrum. If a fetus be held perpendicularly and the head be allowed to drop freely, it falls toward the front, the chin resting upon the breast. This, then, is the longer arm of the cranial lever, the shorter arm being the distance from the center of the head to the occipital protuberance (Fig. 25). The result of this movement of the head is to substitute for either of the two long diameters mentioned a shorter one; thus in place of the maximum diameter of $13\frac{1}{2}$ cm., or $5\frac{1}{3}$ inches, or the occipito-mental, 13 cm., or $5\frac{1}{8}$ inches, there is presented the occipito-frontal, 12 cm., or $4\frac{3}{4}$ inches, or the sub-occipito-bregmatic, $9\frac{1}{2}$ cm., or $3\frac{3}{4}$ inches. A comparison of these last two diameters with those of the pelvic brim will show that when the compression which the mother's soft parts undergo is taken into account, there is no reason why the head when flexed, with the chin upon the breast, should not pass through the pelvis. If the motion opposite to flexion, extension, occurs, one of the vertical diameters of the head is substituted for one of the two greatest, and thus descent is possible; it will be noticed, however, that either flexion or extension must be present, otherwise a large diameter will be presented which cannot pass.

FIG. 25.



A, C. Axis of fetal body.
C. Fulcrum. O, C. Short
arm of lever. C, F. Long
arm of lever.

THE PELVIC FLOOR.—The study of the pelvic floor is of

special interest to the obstetrician. It is that portion of the birth canal most frequently injured in labor and most often demanding repair. From the standpoint of practical obstetrics it may be regarded as composed of two segments: the anterior, upper, shorter segment, and the lower, posterior, longer segment. The former embraces the anterior wall of the vagina and the tissues beneath the pubic joint, while the latter comprises the strong muscles and fascia attached to the sacrum and coccyx. At the moment of labor the second or sacral segment is stretched strongly downward and backward by the advancing fetus, while the first or pubic segment is pushed upward beneath the pubes.

From the standpoint of obstetric anatomy, the levator ani muscle and the fascia and muscular slips attached to the perineal body are the most important tissues in the pelvic floor. These tissues may be divided into three portions: the pubo-coccygeus, embracing the muscles arising beneath the pubic joint and prolonged to the sides of the pubes, with the anterior wall of the vagina and the urethra; the obturato-coccygeus muscle, which arises from the obturator fascia and sides of the pelvis, and the ischio-coccygeus, which includes the muscular slips having origin from the sides of the ischium. The first of these three divisions is known as the pubic, the remaining two as the sacral segment of the pelvic floor. The importance of the perineal body consists in the fact that it is the point of blending and membranous attachment for the interlacing muscular fibers of the superficial tissues of the pelvic floor. While, from the standpoint of the anatomist, the pelvic floor requires minute analysis and description, the obstetrician will gain little by any but a practical study of this region and its functions.

During labor the presenting part descends in the axis of the pelvis downward and backward until the sacral segment of the pelvic floor is reached. The resistance afforded by the muscles

already mentioned as comprising this segment, with the strong coccygeal fascia, exerts a considerable obstacle to the progress of the head, and forces it upward and forward beneath the pubic joint. The anterior or pubic segment of the pelvic floor is lifted upward and greatly compressed beneath the pubic joint by the presenting part. The movement of the coccyx upon the sacrum at the sacro-coccygeal joint and the elasticity of the tissues enable the sacral segment to move downward and backward. The movements of the two segments of the pelvic floor may be likened to those of folding doors swinging in opposite directions. In the space left between these segments, room is afforded for the escape of the presenting part.

Regarding the question of injury to the pelvic floor, it is a familiar fact that it is not a simple linear tear which results in serious disability, but the separation from their points of attachment to the sides of the pelvis and their insertion into the perineal body of the muscles, which have been collectively described under the heads of the segments of the pelvic floor; and it is also evident that in the repair of recent injuries it is not sufficient to simply bring the superficial parts in accurate apposition. Beginning from above, the laceration in the vagina should be brought together until the perineum is reached. It is well then to begin a second line of sutures extending from the lower end of the tear in the perineum upward to meet the first. Inequalities in the tissues can then be adjusted and an accurate closure be made. The suture should be carried beneath the entire surface of the tear, emerging and re-entering, if desired, in the center of the tear.*

By reference to the movements of the segments of the pelvic floor we appreciate the advantages of that method of delivery

* For more explicit directions for closing such lacerations, the reader is referred to the treatment of the accidents of labor.

in head presentations which consists in pushing the pubic segment upward and backward by pressing the head up beneath the pubic joint with the left hand, passed between the mother's thighs, while the right, spread out upon the sacral segment of the pelvic floor, regulates the stretching of these parts by the head as it advances, estimates the elasticity of this segment, and finally allows it to retract between the pains, over the head of the child.

As the orifice of the birth canal at the vulva becomes an oval with tense edges, during delivery, it will be seen that lateral incisions at the center of each side of the oval, when the parts are excessively tense and rupture is threatened, will enable both pubic and sacral segments to retract to better advantage. Such a procedure is termed episiotomy.

CHAPTER V.

THE MOTHER IN PREGNANCY.

CHANGES IN THE MOTHER OCCASIONED BY PREGNANCY.—These may be described as of two kinds : functional and organic. Under the first may be considered disturbances of digestion, and of the functions of the nervous system, while under the latter may be included the various hypertrophies in the tissues of the body, including the uterus, variations in the composition of the blood, and structural changes in the skin and in the excretory organs.

The first functional change most commonly observed consists in variations in appetite and digestion. There is no anatomical reason for these abnormalities, and they must be classed as reflex, temporary, and functional. They consist of nausea, repugnance to food, appetite for unusual articles of diet, excessive or diminished appetite. The result of these functional disturbances is usually a temporary condition of anemia, which often disappears as pregnancy advances. In many patients, a full and even ravenous appetite after the third month of pregnancy produces a condition of plethora. In some, assimilation, which is ordinarily defective, is greatly stimulated by pregnancy.

Disturbances of the nervous system consist in an increased sensibility to reflexes ; heightened excitability of the central and peripheral nervous system, manifested by melancholia or exaltation, apprehension, increased imagination, and, very commonly, forebodings of evil. The sympathetic nervous system is especially liable to functional variations, and the

balance ordinarily maintained in the organism seems to disappear on a slight cause which occasions general perturbation, the action of the heart and respiration being especially affected.

The most important structural changes occur in the genital organs. The uterus becomes twenty times heavier than before pregnancy ; its surface about seventy times larger ; its capacity several hundred times as great. Its muscle hypertrophies by the development of additional fibers from embryonic muscle nuclei. Its walls are thinner than in the non-pregnant uterus, but elastic and resisting. The endometrium undergoes corresponding hypertrophy in its glandular elements. The entire genital tract shares in the hypertrophy of the uterus, in its muscular, elastic, and epithelial structures. The neck of the womb softens, the difference being very noticeable on touch. In first pregnancies the external os is usually closed during pregnancy ; in women who have borne many children it can be readily entered by the finger.

The hypertrophies otherwise observed are found in certain portions of the mother's skeleton, as the inner table of the skull and about the joints. The vascular system is marked by hypertrophy of the left ventricle and of the muscular coat of the arteries. The skin is altered by the deposit of pigment in various portions of the body, forming the areola around the nipple, and sometimes giving the face a dusky hue and forming patches of discoloration upon the thighs and abdomen. The excretory organs undergo a general glandular hypertrophy, which consists in a multiplication of the cells of the various organs. The same change is observed in the secretory organs of the body. The changes in the blood are at first a diminution in the red corpuscles and hemoglobin, followed by a decided increase as pregnancy advances. The loss of blood usually occurring at labor results in temporary diminution of the amount of corpuscles and coloring matter,

followed during the healthy puerperal state by an increase to an amount equal to or greater than that found during pregnancy. As the red corpuscles and hemoglobin diminish, the white corpuscles and water increase ; albumin diminishes at first, as does fibrin, but toward the latter months of pregnancy fibrin increases very considerably.

Marked anemia occurring during pregnancy cannot be regarded as physiological, but is usually caused by improper hygienic surroundings. Anemia after labor is usually the result of hemorrhage, and occasionally follows the establishment of the function of lactation ; as a rule, however, when the secretion of milk is well established, anemia should give place to a normal condition of the blood, and very often to slight plethora.

CHAPTER VI.

THE DIAGNOSIS OF PREGNANCY.

While many conditions exist which may justify a presumptive diagnosis of pregnancy, yet a certain diagnosis of this condition cannot be made before the existence of the fetus is appreciable by sight, hearing, or the tactile sense. The conditions upon which presumption may be based are the cessation of menstruation, nausea occurring in the early morning, abnormal sensibility with sensations of prickling, stinging, or sharp pains through the mammary glands, with discoloration about the nipples: a sensation of weight or fulness of the lower portion of the abdomen, and those ill-defined sensations which cause the woman to believe that pregnancy exists. These conditions, however, may all be present, and yet the patient not be pregnant.

Again, from the standpoint of the physician, presumptive evidence may be found of pregnancy, and yet the condition be absent. Any cause which produces an enlargement of the uterus and softening of the neck and mouth of the womb may give rise to a presumption of pregnancy, especially if menstruation is absent; but it must be insisted upon that it is not until the physician can feel the movements of the fetus, or see those movements through the abdominal wall of the mother, or hear the beating of the fetal heart, that a positive diagnosis of pregnancy can be made.

A strong presumption that ectopic or extra-uterine pregnancy exists may be based upon absence of menstruation; a tumor found by examination near the uterus, but distinct from it; changes of the mammary glands; the fact that the

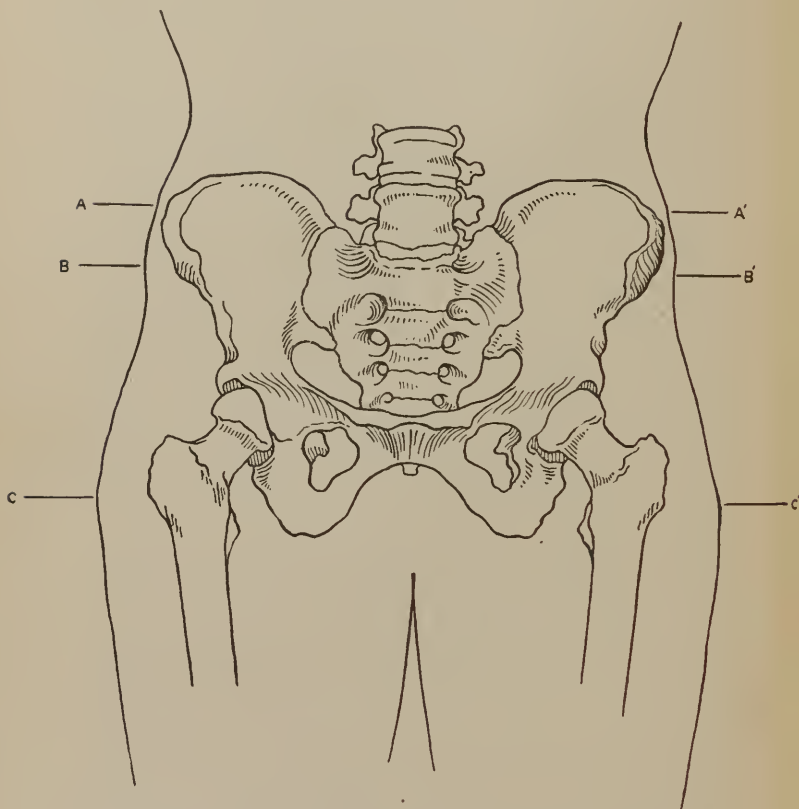
uterus itself can be demonstrated to be but slightly enlarged, and the occurrence of irregular attacks of hemorrhage. While there is no one symptom on which a positive diagnosis of ectopic pregnancy can be made, yet if decidual membrane can be demonstrated as discharged coincidently with hemorrhages, a very strong presumption exists, especially if the other symptoms be present.

If the physician be consulted by a patient who has reason to suppose herself in the early months of pregnancy, a careful examination should be made, and if a strong presumption exists, this fact should be stated to the patient. She should be instructed regarding the hygiene necessary for this period, and informed that a positive diagnosis cannot be made for several weeks or months. As early in pregnancy as possible, the physician should examine his patient thoroughly to make a positive diagnosis of pregnancy, and also to determine the presence or absence of any abnormalities of the pelvis or birth-canal of the mother. A second examination at seven or eight months should be made to diagnosticate the position of the fetus, and to determine the necessity for version or some procedure to alter an abnormal position at the occurrence of labor.

When the first examination takes place, it is well to make an appointment with the patient to come to the physician's office, or that he may call upon her at her home. The assistance of a friend or nurse is often advantageous and agreeable. The patient should be instructed to lie upon a bed or couch, clad so that but one thickness of linen will be found covering the abdomen and pelvis. The physician should palpate the abdomen carefully, mapping out the enlarged uterus, and auscultate for fetal heart-sounds, being careful to take sufficient time to recognize them, and then measure the patient's pelvis. All of this can be done through one thickness of linen, if that linen be not new and stiff.

The pelvic measurements, which should be invariably made are but three in number: they are, between the anterior superior spines of the ilia, twenty-six and one-half centi-

FIG. 26.



A, A'. Distance between crests of ilia. B, B'. Distance between anterior superior spinous processes of ilia. C, C'. Distance between trochanters of femora.

meters, or, in round numbers, ten inches; between the crests of the ilia, twenty-eight centimeters, or eleven inches; from

beneath the spine of the last lumbar vertebra to the middle of the pubes, eight inches, or twenty and one-half centimeters. This measurement is known as the external or Baudelocque's conjugate diameter. Three and one-half inches or nine centimeters should be subtracted for the thickness of the sacrum and pubes. Four and one-half inches, eleven centimeters, the remainder, is known as the internal conjugate, or *conjugata vera*. To make the last measurement, the patient should turn upon her side, her thighs flexed, and lying conveniently with her face turned away from the physician. Should doubt exist as to the location of the last lumbar spine, visual inspection of the back may be made without offending the patient. If the three measurements given are found to be normal, the probability that any deformity in the bony birth-canal exists sufficiently great to complicate labor, is very slight. The distance between the trochanters may also be conveniently measured; it is thirty-two centimeters, or thirteen inches (Fig. 26).

At the second examination the position of the fetus should be carefully outlined by palpation, and auscultation be repeated. Palpation is best performed by standing with the face toward the patient's feet, the extended hands resting lightly upon the patient's abdomen. By gentle pressure simultaneously with both hands, a sense of resistance can usually be readily appreciated, which will indicate the location of the child's back. The finger tips of each hand should then be placed in line parallel with Poupart's ligament on each side; by gentle, but deep pressure downward and inward, the presenting part is felt. If now both hands be moved together either to the right or left, the head or breech will be felt to move with the hands. In women whose tissues are relaxed, the position of the head, in extension or flexion, can often be determined. The site of the placenta can occasionally be found by palpation when it is situated upon the anterior

wall of the uterus. In multiple pregnancies, the observer must outline three large fetal parts or extremities before a diagnosis can be made by palpation. Two distinct fetal hearts must be heard by auscultation to make a diagnosis positive.

Information of value may also be gained by the obstetrician if, during palpation, he will notice the muscular development and consistence of the round ligaments and abdominal walls, as their contraction furnishes an important accessory force in labor. The bladder should be invariably emptied before palpation, as a full bladder renders an accurate examination impossible. During palpation fetal movements are appreciated by the fingers, and often seen in cases where the fetus moves vigorously. In hysterical or maniacal patients a slight degree of anesthesia may be required for a satisfactory examination. On auscultation, in head presentations the heart sounds are heard below the umbilicus, on the left or right side; in breech presentations above the umbilicus; in transverse positions near the pubes. A loud, rushing sound, synchronous with the mother's pulse, is the uterine souffle, caused by the blood in the enlarged uterine sinuses. A faint, rapid hissing sound is the umbilical souffle, a murmur in the cord which is twisted about the fetus. Gas may be heard to crackle in the mother's intestines. The beating of the mother's aorta is often very distinct.

In doubtful cases, percussion must be resorted to in distinguishing the pregnant uterus from ovarian tumors or ascites. It will be remembered that the pregnant uterus forms a solid or semi-solid tumor occupying the center of the abdomen, surrounded on three sides by intestines which usually give a resonant note on percussion. If the patient be turned upon either side, the relative position of the dull and resonant note changes but slightly, while in ascites the gravitation of fluid to the sides alters the location of dullness. An ovarian cyst

can be distinguished in its early growth as located more upon one side of the pelvis. A uterus enlarged by fibroids which are undergoing a cystic and often malignant degeneration may give the same physical signs as the pregnant uterus.

Percussion of the pregnant abdomen should also give information regarding the size of the uterus, and hence the period of pregnancy. In general, we may say that the uterus can first be felt above the pubes at the fourth month. In the sixth month it is at the umbilicus; at the end of pregnancy, a hand's breadth above the umbilicus. We add a table, constructed by Dührssen, showing the size of the uterus at the different months of pregnancy:—

In the 1st month the uterus is slightly enlarged.

In the 2d month the uterus is as large as a goose egg.

In the 3d month the uterus is as large as a child's head.

In the 4th month the uterus is as large as a man's head, and can be felt by external examination above the symphysis pubis.

In the 5th month the uterus is half-way between the umbilicus and the symphysis.

In the 6th month it is at the umbilicus.

In the 7th month it is two fingers' breadth above the umbilicus.

In the 8th month it is the width of the hand above the umbilicus.

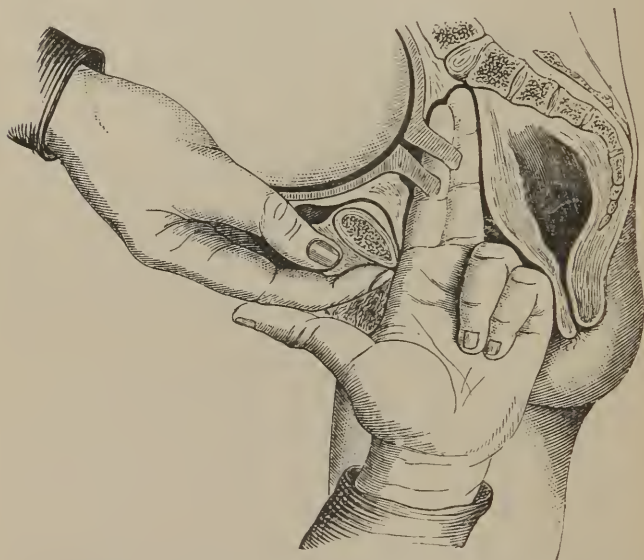
In the 9th month it is at the xyphoid process.

In the 10th month it is again the width of the hand above the umbilicus.

If any thing abnormal be detected in the position of the fetus indicating disproportion between the child and the mother's pelvis, an internal examination should be made (Fig. 27). To measure the antero-posterior diameter of the pelvic brim (*conjugata vera*, true conjugate) the patient is placed on her back at the edge of a bed or table, her thighs flexed. The bladder and rectum being empty, the physician introduces the index and second fingers of one hand, pushing the cervix aside, and touching the promontory of the sacrum with the second finger. The edge of the hand is raised against the sub-pubic ligament, and with the nail of a finger

of the other hand the point where the edge of the pubes presses is marked upon the examining hand, which is then withdrawn, and the distance from the tip of the second finger to the point marked is measured by tape line or pelvimeter. Two centimeters, or three-fourths of an inch, is deducted for the thickness of the pubes. The measurement first obtained

FIG. 27.



INTERNAL MEASUREMENT OF THE ANTERO-POSTERIOR DIAMETER OF PELVIC BRIM.

is thirteen centimeters, less two, is eleven centimetres, or four and a half inches. It is well to follow the sacral curve upward with the examining finger, to avoid mistaking the projection of other sacral vertebræ for the promontory.

If the maternal parts be relaxed and labor be approaching, it is well to attempt to estimate the proportionate size of the

fetus and the pelvis by pressing the presenting part gently downward into the pelvis while its progress is recognized by an internal examination. It cannot be too strongly urged that it is the duty of the physician to make preliminary examinations in every case, as experience has shown us that they can be so conducted as to give the patient no inconvenience, while affording valuable data for the conduct of labor.

The pelvimeter which we commonly employ is indexed in centimeters and inches, and can be conveniently taken apart and carried in the pocket (Fig. 28).

In making a vaginal examination to determine the existence

FIG. 28.



of early pregnancy, in addition to the softened condition of the os and cervix, the lower uterine segment may be distinguished in many cases. The finger may detect softened, elastic tissue just above the cervix, the body of the uterus swelling out above it as the body of a jug bulges sharply above its neck. It is often necessary to examine with one finger in the vagina and another in the rectum, to obtain this sign distinctly. This is Hegar's sign, and can be found at the third or fourth month.

Cases will come to the notice of practitioners of experience where the reputation and happiness of the patient may depend

upon the physician's diagnosis. In such cases the greatest caution must be exercised ; the physician must give no statement which can be misconstrued. He will do well to satisfy himself with a statement of what he actually finds after a careful examination. He may then state that such symptoms and conditions sometimes accompany pregnancy, but, unless he is positive, that an absolute diagnosis at the moment of speaking is impossible.

CHAPTER VII.

THE HYGIENE OF PREGNANCY.

The care of the pregnant woman should begin from the time when her condition is first suspected. Fortunately for her, that which is best for her if pregnant, is also proper care if she be not pregnant, but suffering from any condition which may give rise to a supposition of pregnancy. A subject of perhaps the first importance at this time is the patient's dress. It is best to lay aside corsets, or if the patient will not do this, to wear such as have been carefully made to fit the body loosely. Better than corsets are waists of various sorts, to which skirts can be buttoned, and which are so devised as to avoid injurious pressure. The important point is to remove from the abdomen the pressure of the patient's clothing, and the benefit to be derived from this will not be realized until a radical change in the patient's dress is made. If skirts are not attached to a properly constructed waist, they should be supported from the shoulders by suspenders.

Next to the patient's skin should be worn woolen of fine quality and light weight. The so-called combination suits, in which shirt and drawers are virtually one piece, are excellent in this condition. Woolen or silk stockings should be worn, and, if possible, supported without encircling garters. Shoes and slippers should be sufficiently easy to avoid pressure, and if warm clothing is necessary, dresses and wraps may be altered or made so as to keep the patient thoroughly warm while distributing the weight of the garment as evenly as possible, suspending them from the shoulders. Many of the

pressure symptoms from which patients suffer during the early months of pregnancy are more relieved by the adoption of suitable dress than by any other measure.

The first symptom for which the physician will commonly be asked to prescribe is nausea and vomiting. The patient should be informed that these symptoms are almost the invariable accompaniments of her condition, and that they will grow better as time goes on. Drugs should be used as sparingly as possible, and the case can often be palliated by simple precautions regarding the taking of food. Many patients get on comfortably by taking breakfast in bed. Others are helped by a cup of soup, or tea, or coffee, hot water, an effervescing drink, champagne, brandy-and-soda, while severe cases require confinement in bed and the most careful feeding, nutritive enemata being especially useful. Slight dilatation of the cervix relieves a considerable number of cases of the vomiting of pregnancy. The finger is the best dilator, or a hard rubber dilator of about the same size. Where endocervicitis is present alterative applications are indicated. A strong solution of silver nitrate gr. 20 to the \mathfrak{z} , has been often advantageous. Creolin or iodine is also useful. Such applications should be followed by a glycerin tampon.

In general, it may be stated that every cause of irritation about the womb should be removed, and this, in many cases, will greatly diminish the nausea and vomiting. It is especially necessary to see that the patient does not suffer from constipation, and her unpleasant sensations will often disappear when this is remedied.

Should these measures, however, not be sufficient, and the patient become anemic, the aid of drugs should be sought. Oxalate of cerium, or valerianate of cerium, subnitrate of bismuth, pancreatin, pepsin, and ingluvin may also be tried. Two and a half, or five grains, of one of the compounds of cerium, frequently repeated, often gives good results. Bis-

muth may be used in these and larger doses. The digestive ferments may be given with food, or pre-digested food may be employed. Should this not be sufficient, one drop of tincture of iodine may be given, or creasote, or carbolic acid. Cocain, or wine of coca, will often be successful when all else has failed. Fowler's solution and tincture of nux vomica may be given in doses of one drop of each. Numberless other remedies have been employed, and each case must be studied and treated upon its own merits. It must be remembered, however, that the local treatment of the uterus, and the patient and skilful use of small quantities of suitable nourishment, with the digestive ferments, furnishes the most rational method of treating these complications. If the trouble persists, the physician should assure himself that the uterus is not dislocated, especially by some backward displacement. It will often be possible, by using finely carded wool or jute in the form of antisepticized tampons, to restore the uterus to its proper position, and relieve the patient's symptoms. In cases of obstinate vomiting in pregnancy, every remedy should be tried which offers the slightest prospect of success. Among those recently employed is menthol, which may be given in doses of from one to five grains. In extreme cases, rest in bed with gastric irrigation and feeding by rectal injections are indicated.

The question of the interruption of pregnancy will depend upon the presence or absence of dangerous anemia in the mother. As our study of the blood progresses, we shall undoubtedly be able to recognize conditions dangerous to mother and child alike by microscopic examination of the maternal blood; at present, however, the general rule may be stated that whenever the mother is threatened with dangerous anemia, pregnancy should be interrupted at once. It may be possible, after the uterus has been emptied, to cure an endometritis, or remedy some other condition which has

caused the patient's suffering. A repeated pregnancy would then result successfully. In replacing a retroverted pregnant uterus, it will be well to hold it in position by some device other than a stiff pessary. Tampons such as have been already mentioned may be covered with ointment of equal parts of lanolin and cosmolin, to which is added powdered boracic acid, ten grains to the ounce. In hospital practice, an ointment of balsam of Peru, cosmolin, and iodoform may be used to advantage. Warm douches may be very cautiously taken if there be persistent irritation about the uterus, and if the douches can be administered by a thoroughly competent and careful person.

Regarding the further hygiene of pregnancy, it may be stated that moderation is the golden rule. The patient's usual tastes in the matter of food and drink should be consulted and continued. She will do well to avoid fatigue, especially standing and walking for long periods. There should be an abundance of sleep and an abundance of fresh air. Lukewarm baths should be taken daily, or, if preferred, a sponge-bath of moderately cold water. She should avoid long drives over rough roads, but should frequently take drives of moderate length and over smooth roads. Sea-sickness should be avoided, and any excitement or overstrain. Very hot churches and theaters, and crowds of any sort should be shunned. At the same time, every care must be taken to make the patient's life during this period one of interest and pleasure. Her natural forebodings should be met by kind encouragement, and books and surroundings which furnish healthful diversion may be amply supplied. There is sufficient evidence that the mother's emotions influence the child powerfully to make it necessary for her to avoid fright or an outburst of any violent emotion. It should be remembered that the teeth are especially liable to deteriorate during this period, and the services of a dentist may be sought early in

pregnancy. The patient should be urged to take moderate exercise in the open air. Her diet should be of the most easily digested and nutritious articles of food. If the patient be found to be lapsing into a condition of malnutrition, arsenic, iron, cod-liver oil with hypophosphites, malt and meat extracts may be persistently given. Koumyss or Maitzoon, will be found useful in such cases.

Pregnant women are especially apt to suffer from constipation and deficient elimination. The bowels may be encouraged to move regularly by regular habits, endeavoring to secure an evacuation at a regular time. Bread made of coarse flour, fruits and vegetables in season, an abundance of pure water, should be included in the diet. Sponging with cold or cool water is also useful. And of especial importance are the entire abandonment of constricting clothing and regular, gentle exercise. Constipation and sluggish action of the kidneys are directly dangerous in pregnancy.

If laxatives must be used, compound licorice powder, compound rhubarb pills, aloin, strychnia, and belladonna, or compound colocynth pills, with compound cathartic pills if the tongue is foul, are indicated.

CHAPTER VIII.

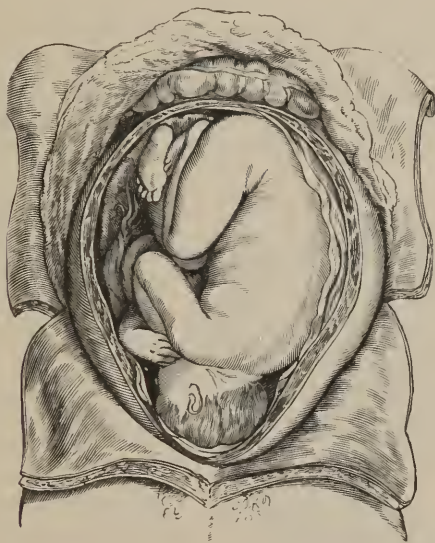
THE ATTITUDE AND LOCATION OF THE FETUS; THE DURATION OF PREGNANCY.

At five or six months of pregnancy the fetus begins to assume a definite position in the uterus, and can be recognized as having a definite relation in situation to the mother. By a natural law of accommodation, an ovoidal body contained in a cylinder naturally turns its long axis parallel to that of the cylinder. This is exemplified in the fact that, as the fetus grows, it assumes a position which, in a majority of cases, brings the head to present at the brim of the pelvis, the breech and feet occupying the fundus of the uterus. The ovoidal shape of the fetus is the result of a condition of flexion which approximates the limbs and head to the trunk. During the early months of pregnancy the specific gravity of the amnial liquid is so great that the fetus floats readily about, assuming no definite position; but, as it increases in size, its specific gravity exceeds that of the amnial liquid, and hence the heaviest portion of the fetus tends to sink lowest in the uterus, and this fact, together with the law of accommodation already mentioned, results in the attitude and location of the fetus. In obstetric phraseology, these facts are described under the head of (Fig. 29)—

POSITION AND PRESENTATION.—By position is meant the relation which a definite portion of the fetal body bears to a definite portion of the birth-canal of the mother. By presentation is meant that portion of the fetus which descends lowest in the birth-canal, and which comes first to the notice

of the obstetrician on examination. As we have said, ordinarily the head of the fetus sinks lowest, and hence presents most frequently. The majority of presentations, then, are head presentations. From the fact that the attitude of the fetus is that of flexion, it results that the top of the head or vertex is the portion of the cranium which is most frequently lowest, and hence presents. Thus it happens that the major-

FIG. 29.



THE USUAL ATTITUDE AND LOCATION OF THE FETUS.

ity of head presentations are vertex presentations. Should the attitude of flexion of the head not exist, but should the head have become extended, the face of the fetus will be lowest, and hence, while the head will continue to present, the face, instead of the vertex, will be the portion of the head sinking lowest into the pelvis.

On the other hand, the child may present by the lower extremity of the trunk or breech, and thus the long axis of the fetal ovoid be brought to correspond with that of the cylindrical birth-canal of the mother. Occasionally, through some failure in the law of accommodation, the fetus at the moment of labor becomes turned transversely across the birth-canal, and then a transverse position results. The efforts of the uterus to expel the child thus turned across the birth-canal result in bending the head upon the trunk with a lateral flexion, the shoulder of the child sinking downward, and finally presenting in the birth-canal.

If we enumerate the presentations which may occur, we shall find five : the vertex, the face, the breech, the right and

FIG. 30.



LATERAL SURFACE OF THE PELVIS.

the left shoulder. If we consider the situation which any of these presenting portions may occupy in the mother's pelvis, we shall have the positions and presentations grouped together.

It is of the utmost importance that, in studying obstetric cases, the obstetrician remembers the simple fact that the mother's pelvis has two sides, the right and the left. If the bony pelvis be examined, it will be seen that the points projecting furthest toward the center of the pelvis from each side are the spines of the ischia ; extending obliquely upward and outward from these points there will be

seen a slight elevation or ridge on the bony surface of the wall of the pelvis. This slight ridge, like a water-shed, divides each side of the pelvis into an anterior and posterior half. The pelvis may then be said to have a left anterior compartment and a right anterior compartment, a left posterior compartment and a right posterior compartment. It only remains to locate the fetus in one of these four compartments to complete what is technically described as a presentation and position (Fig. 30).

It must be remembered, however, that more important than the especial compartment in the pelvis occupied by the presenting part is the question as to which side of the abdomen the back of the fetus occupies. In fact, the more rational and modern view makes but two positions: If the back of the child be toward the left side of the mother's pelvis, it is the first position; if the back of the child be toward the right side of the mother's pelvis, it is the second position. When the mechanism of labor is considered, it will readily be seen how this simple division of positions accounts for the phenomena of labor. In the majority of cases the back of the child lies upon the left side of the mother's abdomen, the vertex presenting at the entrance to the pelvis, and turned in its left anterior compartment. The resulting position and presentation is a left occipito-anterior, and this will be found in more than three-fourths of all cases.

THE DURATION OF PREGNANCY is usually two hundred and eighty days. Instances where pregnancy is prolonged for ten months and more are not rare. The cause for the termination of pregnancy has not been clearly demonstrated; but it is most probably the fact that the fetus can no longer be adequately nourished by the mother. The accumulation in the mother's blood of irritating compounds derived from the processes of fetal nourishment causes an increased excitability to reflex stimuli. As the fetus grows, its movements become

more vigorous, until the uterus is roused to contraction, and labor results. Rhythmic contractions of the uterus continue during pregnancy and furnish a sign of pregnancy. They assist in bringing the long axis of the fetus to coincide with that of the uterus.

In estimating the duration of pregnancy it is best to avoid fixing an especial date, especially with primiparæ. From ten days to two weeks' variation from a calculated date is not unusual. It is customary to reckon from the last day of menstruation, and a simple rule of calculation may be stated as follows :—

Count backward three months from the last day of menstruation, and add one year and seven days to the date thus reached. In questioning patients to ascertain the date of last menstruation, the answer elicited will often refer to the date of the beginning of menstruation, instead of the end, the day desired.

CHAPTER IX.

NORMAL LABOR ; THE HEAD PRESENTING.

By labor is understood that process of contraction of the uterus and abdominal muscles which results in the extrusion of the fetus. It may be commonly divided into three stages : the first, the stage extending from the beginning of expulsive uterine contraction until the birth-canal is fully dilated ; the second, the interval occupied by the extrusion of the fetus ; the third, the time required for the delivery of the membranes and placenta.

The characteristics of the first period of labor vary in different individuals in first and subsequent labors. Intermittent uterine contractions occur frequently during pregnancy, and have much to do with accommodating the fetus to the birth-canal. The beginning of a first labor is usually characterized by an intensification of these wave-like uterine contractions, occupying a varying number of hours. Thus a patient may be in this stage of labor for one or two days before active pains begin. As the name indicates, uterine contractions or labor pains are attended by suffering. Nerve fibers in the walls of the uterus are compressed by the contractions of the uterine muscle, and nerve trunks lying along the brim of the pelvis are also subject to contusion. The stage of intermittent uterine contraction is marked by the dilatation of the os uteri and the gradual expansion of the cervix. When this process is completed, the membranes commonly rupture, and the actual expulsion of the child begins.

The diagnosis of labor often requires perception and judg-

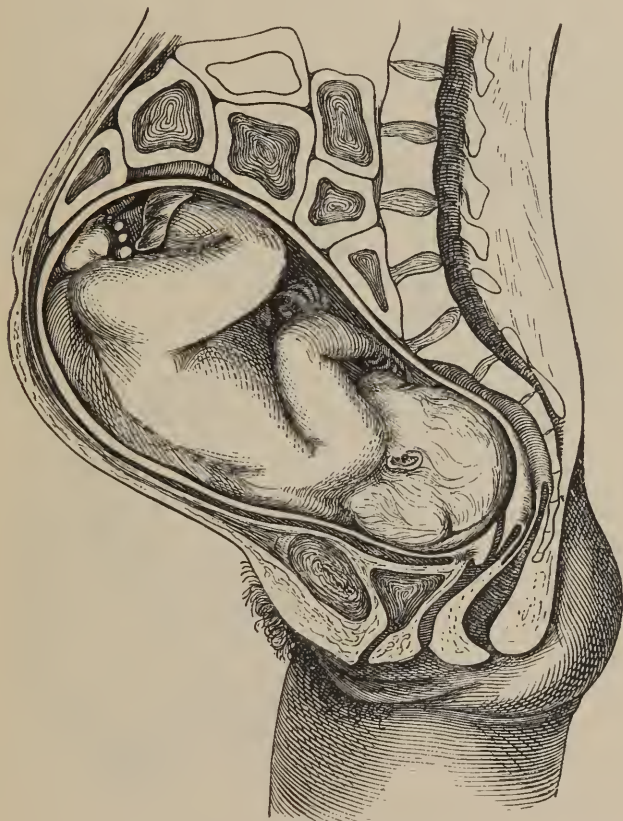
ment on the part of the physician. He will frequently be called to primigravidæ, who imagine themselves in labor because abdominal pain is experienced. Acute indigestion, muscular rheumatism of the walls of the abdomen, intercostal neuralgia, and an exaggerated nervous condition may all give rise to the sensation of abdominal pain. The practitioner can best satisfy himself as to the presence or absence of genuine labor pains by placing his patient in a comfortable position upon a bed or couch, and having her clothing so arranged that his hand can rest upon the abdomen. He will then appreciate the frequency and vigor of uterine contractions, and after a short time of observation can generally determine whether labor has actually commenced or not.

The arrival of the physician, especially if he be a stranger, will not infrequently cause the pains of the first stages of labor to cease for a short time. Tact should be used in approaching a parturient patient for the first time, and the physician will do well not to enter her room until his coming has been announced and a few moments have elapsed. During the second stage of labor uterine contractions will usually go on without interruption.

As labor proceeds, the sensations of pain, which at first are diffused through the abdomen, will commence in the back, extending along the sides of the abdomen to the supra-pubic region. Although intermittent, they will increase in frequency and severity until, the membranes having ruptured, they become later in labor almost continuous. Positive information regarding the exact stage of a labor can be obtained by internal examination only. In multigravidæ, experience enables a patient to estimate with greater accuracy the exact stage at which the practitioner should be summoned. A vaginal discharge of blood-stained mucus is usually a symptom of the dilatation of the cervix and the beginning of actual labor.

The mechanism of labor in head-presentations consists of the adaptation of the head to the brim of the mother's pelvis, the descent of the head and body of the child into the cavity

FIG. 31.

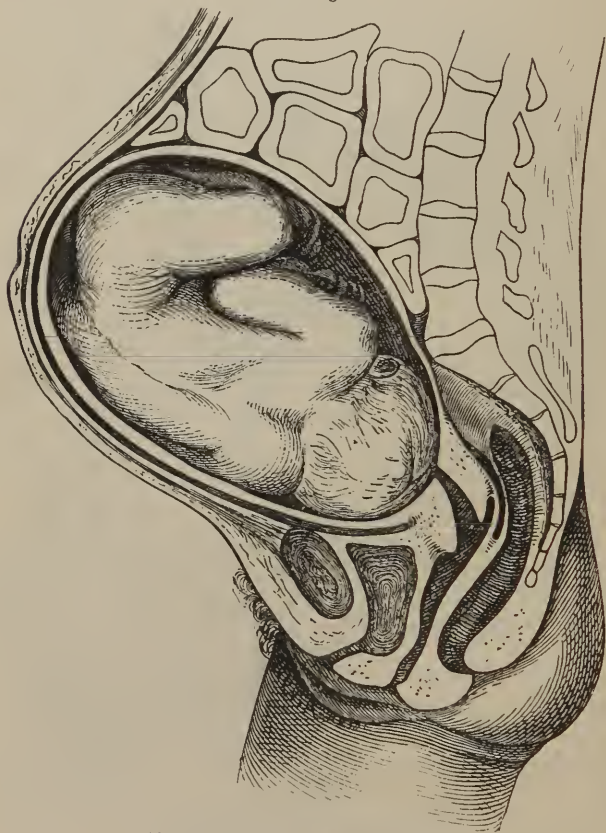


THE FETUS IN A PRIMIGRAVIDA.

of the pelvis, the rotation of the child as a whole toward the anterior surface of the mother's body, and, finally, its expul-

sion. During the later weeks of pregnancy, the intermittent uterine contractions to which reference has been made, aided by the elasticity of tissues previously distended, will generally

FIG. 32.



THE FETUS IN A MULTIGRAVIDA.

result in the descent of the presenting part (Fig. 31) into the cavity of the pelvis in primigravidæ. In multigravidæ,

however, at the commencement of labor the head will probably be found at the brim of the pelvis, resting against its upper edge (Fig. 32).

The movement of accommodation by which the head enters the pelvis will consist in adapting the diameters of the fetal head to those of the pelvis. The head entering obliquely in the majority of cases, the vertex being at the left anterior half of the pelvis, the chin and face of the child will point toward the right posterior portion. It will be remembered that the oblique diameters of the pelvic brim in the living patient measure four and three-quarters inches, twelve centimeters. The occipito-frontal diameter of the head measures also four and three-quarters inches, or twelve centimeters. By relaxing the ilio-psoas muscles the oblique diameters of the pelvis are capable of slight increase, sufficient to enable them to accommodate the occipito-frontal diameter of the head. These muscles may be relaxed by flexing the patient's thighs upon the abdomen, and this simple maneuver will often assist in the descent of the head in a lingering labor.

Should, however, the head be large for the pelvis, it may become necessary to substitute for the occipito-frontal a smaller diameter. The fetal head is placed upon the trunk like a lever across its fulcrum, the long end of the lever being the distance from the chin to the foramen magnum. The tendency shown by the human head to drop forward upon the breast, as exemplified in adults as well as in infants, illustrates the fact that the preponderance of weight is in front of the center of gravity. This movement of complete flexion substitutes for the occipito-frontal diameter the sub-occipito-bregmatic, which averages nine and five-tenths centimeters, or three and three-fourths inches. In the opposite oblique diameter, the left, will be found one of the transverse diameters of the fetal head. Thus, when the occipito-frontal diameter occupies the right oblique diameter of the pelvic

brim, the bi-parietal will be in the left oblique diameter. When perfect flexion has occurred with some descent, the bi-temporal will be found in the left oblique diameter. Both of the transverse diameters of the head are sufficiently small to be easily accommodated in the oblique diameters of the pelvic brim. The head having been perfectly flexed, descends gradually through the pelvic brim into the cavity of the pelvis (Fig. 33).

FIG. 33.



THE DESCENT OF THE FETUS.

The back of the child remaining directed toward the left side of the mother, the trunk descends as the head precedes it, the bis-acromial diameter of the trunk, which measures four and three-quarter inches, or twelve centimeters, engaging in the left oblique diameter of the pelvic brim.

When the fetus has descended sufficiently to fairly enter the pelvic cavity, the membranes have commonly ruptured, the amniotic liquid escapes, and the

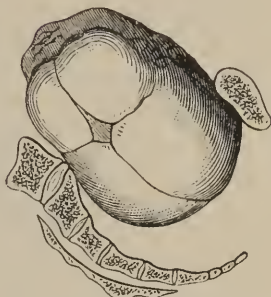
exact position of the head can readily be determined upon examination. In the first position, a left occipito anterior, the sagittal suture will be found occupying the right oblique diameter of the pelvis (Fig. 34). Toward the mother's right side, and a little posterior to the center of the pelvic cavity, can be felt the anterior fontanelle. This landmark is not

obliterated by the pressure which the fetal head undergoes, and it may be readily distinguished by its size, and by the fact that out from it run four bony lines. These are the sagittal, the fronto-parietal of each side, and the suture between the two frontal bones. On the contrary, the posterior fontanelle is ordinarily obliterated by the pressure exercised by the walls of the pelvis upon the fetal head, the bones sliding under each other in such a manner as to fill up the interval and leave simply a point of convergence of three sutures, namely, the sagittal and the two branches of the lambdoid. In head presentations a swelling forms on that portion of the head which is not pressed upon during labor. It results from infiltration of the scalp with bloody serum. In vertex presentations with normal rotation, it is found on the upper angle of the parietal bone, opposite the presenting point; in left occipito-anterior, on the upper angle of the right parietal bone. It is called the *caput succedaneum*.

The physician, in his examination at this stage of labor, will find this point of convergence (the smaller, posterior fontanelle) upon the left side of the mother's pelvis, and toward its anterior surface. He will be able to distinguish the sagittal suture extending toward the right and posteriorly, and unless the tissues are firm and resisting, he will also be able to find the anterior fontanelle.

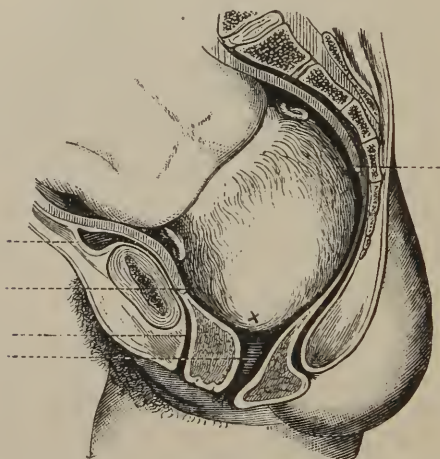
Labor proceeding, a phenomenon of rotation occurs as the head descends. By rotation, we understand the turning of the head upon the pelvic floor so that its antero-posterior diameter is parallel with that of the pelvic outlet (Fig. 35).

FIG. 34.

THE HEAD ENGAGING IN
THE PELVIC BRIM.

It will be remembered that the only pelvic diameter at the outlet large enough to permit the expulsion of the head is the antero-posterior, which may be reinforced by the bending backward of the coccyx at its articulation upon the sacrum. Thus, a diameter of from twelve to fifteen centimeters, or four and three-fourths to over five inches, may be obtained. The anterior turning or rotation of the head

FIG. 35.



THE HEAD REACHING THE PELVIC FLOOR.

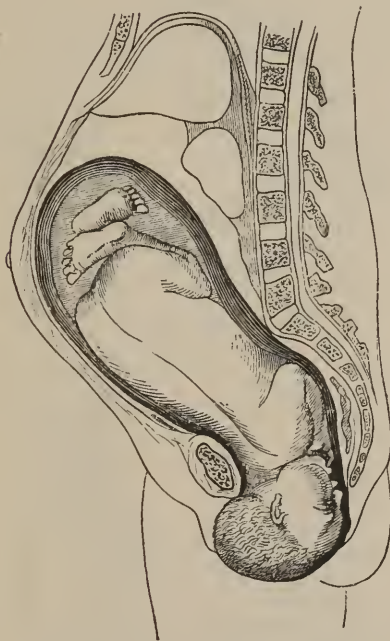
x. The caput succedaneum.

brings the vertex beneath the pubic joint, the occipito-frontal diameter resting upon the antero-posterior diameter of the pelvic outlet. The vertex being forced strongly beneath the pubes, the neck pivots upon the sub-pubic ligament (Figs. 37 and 38).

Under the force of uterine contractions the coccyx is bent backward, and the forehead and face of the child are forced over the pelvic floor and perineum by a movement of exten-

sion. The trunk, meantime, follows the head with a corresponding rotation. The bis-acromial diameter having entered the pelvis in the left oblique diameter, the trunk descends, and the right shoulder of the child, turning toward the pubic joint, is first forced downward, emerging beneath

FIG. 36.

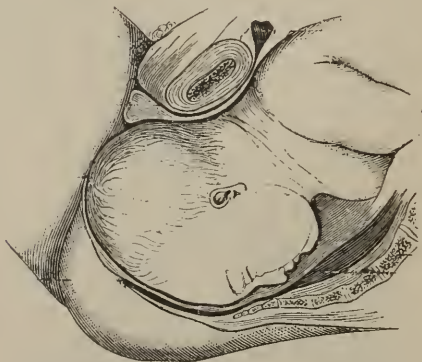


DESCENT AND ROTATION.

the joint with a mechanism similar to that which the occiput has already executed. The lower shoulder is then extruded by a process similar to the extension of the face and chin, and the trunk and limbs of the child follow. The fact that the head rotates and emerges before the shoulders causes the

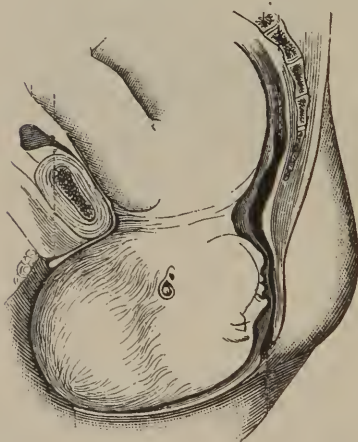
vertex to turn toward the left thigh of the mother as soon as the head is born. There is no diameter of the trunk of the

FIG. 37.



THE HEAD UPON THE PELVIC FLOOR.

FIG. 38.



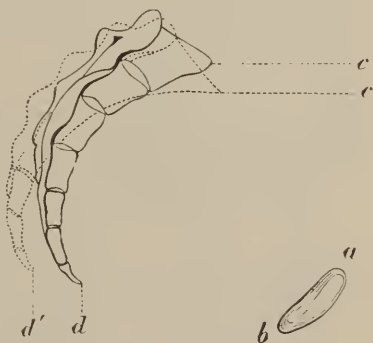
BEGINNING EXPULSION OF THE HEAD.

fetal body, except the bis-acromial, sufficiently large to occa-

sion delay in the mechanism of labor, and the head and shoulders born, only a malformation in mother or child will occasion delay (Fig. 39).

The characteristics of the second or expulsive stage of labor are strong contractions of the uterus, supplemented by those of the abdominal muscles, with fixation of the diaphragm and contraction of such of the muscles of the trunk as are necessary for this phenomenon. At the moment when the membranes rupture, there occurs a discharge of the amniotic liquid, although more or less discharge of blood-streaked mucus has been going on during the first stage. At the intervals between the uterine contractions, a slight pause occurs, during which the patient, if fatigued, often lapses into a condition of partial stupor or sleep. The surface of the body is frequently covered with slight perspiration, the face is flushed, and the entire organism gives

FIG. 39.



RETROCESSION OF COCCYX.

a, b, pubes. c, d, curve of sacrum and coccyx before retrocession. c', d', after retrocession.

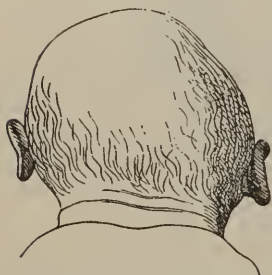
evidence of the great muscular activity which is going on. The complaint of pain increases as contractions become more violent, until the pain seems unendurable. Occasionally a condition of temporary delirium or mania supervenes, which is of short duration. The pulse of the patient, although quicker than usual, is firm and strong, and shares in the vigor of the muscular system.

During the early stages of labor the patient will naturally

assume such a posture as is calculated to bring the head well into the pelvis, thus facilitating birth. She will frequently walk about the room, assume a semi-recumbent position, and often kneel at the side of the bed, her head resting upon her arms, which are folded on the body. After the rupture of the membranes she instinctively assumes a recumbent position, often turning from side to side if her sufferings be severe.

The mechanism of labor when the vertex is directed toward the right side of the mother's pelvis and anteriorly corresponds to that already described,

FIG. 40.



HEAD BORN IN RIGHT OCCIP-
ITO-ANTERIOR LABOR.

with the simple reversal of direction in rotation. Thus the head and trunk, in the first instance rotating from left to right toward the middle line of the body, in the second instance turn from right to left toward the center. While the former is much more frequent, the latter is not to be considered as an abnormal labor. Practically, the distinction between a normal and an abnormal labor, the head

presenting, will depend upon two factors: presence or absence of flexion, and the anterior or posterior rotation of the occiput.

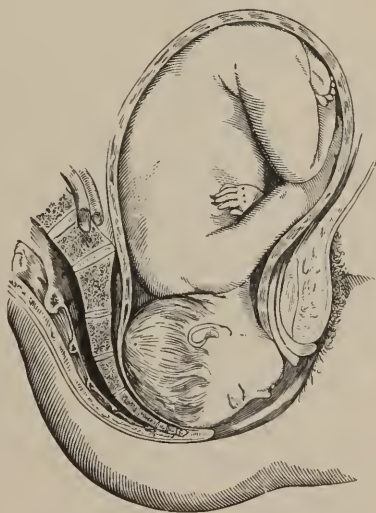
CHAPTER X.

ABNORMALITIES OF LABOR, THE HEAD PRESENTING.

A not infrequent abnormality of labor, the head presenting, is the failure of the vertex or occiput to rotate anteriorly as the head descends. Many writers describe this phenomenon under the head of occipito-posterior positions, but the simpler and more rational explanation is to view them as cases of defective rotation, and not as separate positions and mechanisms.

The physician will find early in labor the vertex presenting, but not turned so plainly in front as is usually the case. The course of labor is more prolonged and greater suffering is sometimes experienced. As the head descends, the vertex, instead of turning to the front, remains directed posteriorly and obliquely, and finally the head reaches the pelvic floor with the occiput near one or other of the sacro-iliac joints. If the expulsive force of the uterus and the abdominal muscles be normally great, and the resistance of the

FIG. 41.



THE OCCIPUT IN THE HOLLOW OF THE SACRUM.

pelvic floor be considerable, the head being flexed, the occiput will turn, in nine-tenths of all cases, toward the front, and the expulsion of the child will be completed as usual. Should, however, the resistance of the pelvic floor be deficient and the expulsive forces be lacking, flexion being incomplete, the head may turn into the hollow of the sacrum and remain lodged in this position. The conditions necessary for anterior rotation of the occiput are, sufficient expulsive force, the resistance of the pelvic floor, and the maintenance of a condition of flexion on the part of the head. When any of these factors is deficient, the impaction of the head may result (Fig. 41).

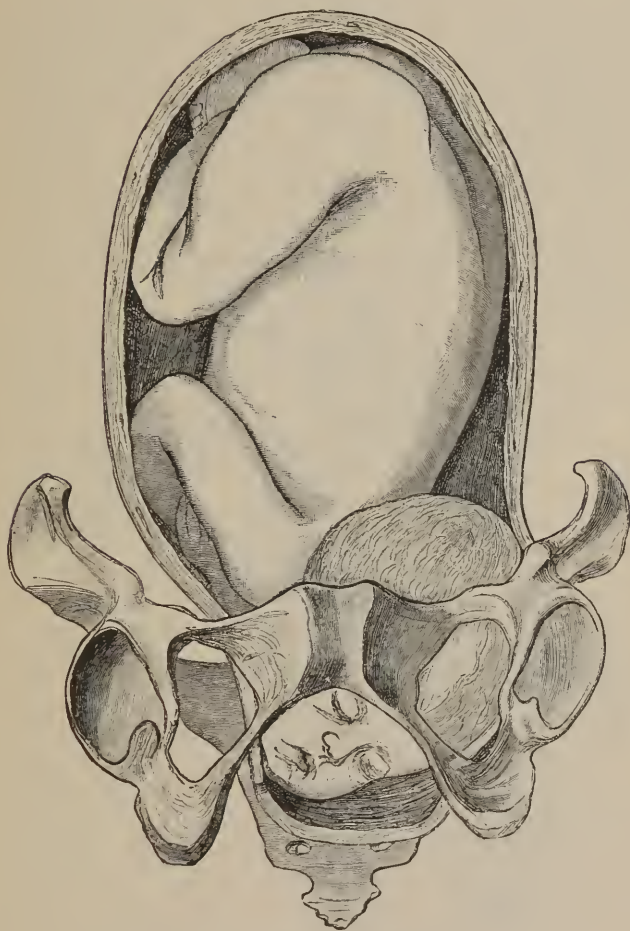
Another abnormality of labor in head presentations occurs when, from any cause, the antero-posterior diameter of the pelvic brim is so much lessened as to encroach upon the oblique diameters, and prevent the head from entering in one of them, as is usual. The head, in attempting to enter, will then turn transversely to the entrance of the pelvis, the occiput upon one side, the forehead upon the other, and if expulsive efforts continue, the head will be flexed laterally upon the spinal column, and one or other of the parietal bones will slip downward and forward, presenting at the entrance to the pelvis. This is known as a Parietal-bone presentation.

A most important abnormality in head presentations is that by which the head becomes extended instead of flexed. Should partial extension occur, what is known as a Brow presentation may result, the lower portion of the forehead and the superciliary ridges becoming the presenting part. Should, however, complete extension be present, a Face presentation will result.

FACE PRESENTATION.—This abnormality of the presentation of the head is definitely named in accordance with the portion of the head which is considered as the presenting part. Thus the forehead may be taken, and the presentation be

spoken of as a Fronto-anterior or posterior presentation.

FIG. 42.



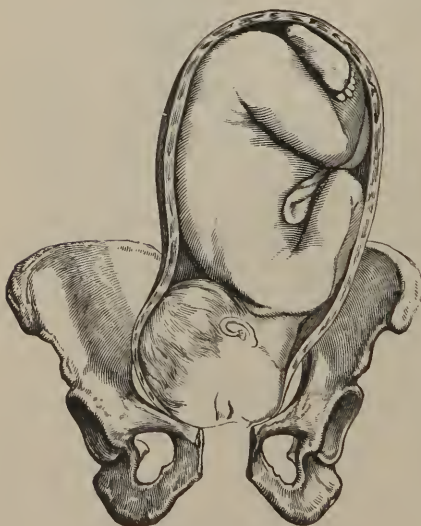
FACE PRESENTATION ; LEFT-FRONTO-ANTERIOR.

Others select the chin, and speak of Mento-anterior or posterior presentation.

The occurrence of either will be best understood by following a case of Left-occipito-anterior, or first-occipital presentation, in which the head, instead of becoming flexed, is completely extended. As the occiput rises upon the left side of the mother's pelvis, the forehead descends, and, sweeping through an arc of a circle in the right oblique diameter of the pelvis, it lodges in the left anterior compartment of the pelvis, formerly occupied by the occiput. The chin sinks deeply into the pelvis pointing toward the mother's right side and posteriorly, the back of the child remaining, as usual, toward the left side of the mother, and turned slightly in front (Fig. 42).

The forehead may be taken as the presenting part, and the

FIG. 43.



RIGHT-FRONTO-ANTERIOR.

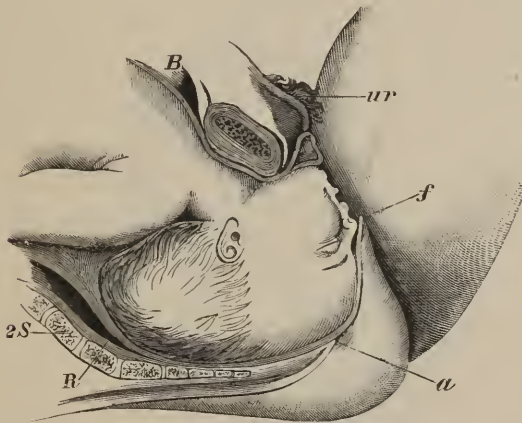
presentation and position will then be called Left-fronto-anterior. This may also be styled the first position in a Face presentation. Should a similar mechanism be executed upon the right side of the pelvis, a Face presentation in the second position would result. Others, however, prefer to take the chin as the cardinal point presenting in these cases, and to name the position Mento-an-

terior or posterior. Thus, the position just described as Left-fronto-anterior might be considered a Right-mento-pos-

terior, and, similarly, the chin may occupy any one of the four compartments of the pelvis (Fig. 43).

The mechanism of a face presentation will depend upon the degree of extension which is present. In a case of Left-fronto-anterior, if extension be completed, the trachelobregmatic diameter of the fetal head will engage in the right oblique of the pelvis. In the left oblique diameter will be

FIG. 44.



MECHANISM OF FACE PRESENTATION.

B. The bladder. *a.* Anus. *2S.* Second sacral vertebra. *f.* Fourchette. *R.* Rectum. *ur.* Urethra.

found the bi-temporal diameter of the head. Each of these diameters will be remembered as less than four inches, or ten centimeters in extent, and, hence, is not sufficiently great to cause delay in rotation. The head descending with perfect extension, the chin should rotate anteriorly and engage beneath the pubic joint. In this way, first the thickness of the head from foramen magnum to the anterior fontanelle, and

then the thickness of the child's trunk above the shoulders, are received in the antero-posterior diameter of the pelvic brim, the chin pivoting beneath the pubes: by a motion of flexion the occiput is brought down over the concave surface of the sacrum, the coccyx, and the distended pelvic floor, finally emerging by the retrocession of the coccyx at the sacro-coccygeal joint. If perfect extension does not exist as the head descends, its maximum diameter, or the occipito-

FIG. 45.



EXPULSION OF THE HEAD IN FACE PRESENTATION.

mental, will be brought in relation with the diameters of the pelvic brim, and impaction will result and labor cease (Fig. 44).

A most dangerous complication in face presentation is the turning of the chin posteriorly into the hollow of the sacrum. The antero-posterior diameter of the pelvis must then receive



Occipito-posterior Presentation.



Brow Presentation.



Face Presentation.



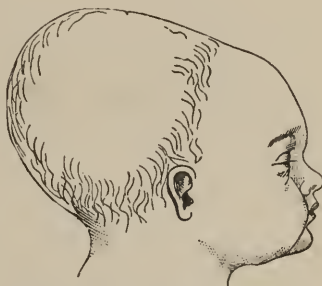
Occipito-anterior Presentation.

SUPPLEMENTARY DIAGNOSIS OF THE COURSE OF LABOR, FROM THE SHAPE OF THE SKULL OF THE NEW-BORN CHILD. (*Olshausen.*)

not only the thickness of the head from the occipital region to the anterior fontanelle, but also the thickness of the chest of the child; the combined mass cannot enter the pelvis, and hence impaction of the fetus results. The factors necessary for the production of a normal mechanism in face presentations are sufficient expulsive force in the uterus and muscles of the abdomen, adequate resistance of the pelvic floor, and the maintenance of extension. A position of the head between extension and flexion in these cases must result in impaction (Figs. 45 and 46).

Cases occur not infrequently in which the head is born last, but this will be considered under breech presentation.

FIG. 46.



HEAD BORN IN FACE PRESENTATION.

CHAPTER XI.

THE TREATMENT OF NORMAL LABOR.

The treatment of the first stage of labor requires the exercise of judgment regarding the administration of drugs which might seem naturally indicated in this condition. When the physician finds the patient actually in the first stage of labor, if she be under the charge of a competent nurse, he will do well to disturb her as little as possible. He should first scrub his hands thoroughly with soap and water; then rinse them; then scrub them in bichlorid solution, one to one thousand. A thorough vaginal examination will then assure him that the time for active interference has not arrived. There are no active means by which the dilatation of the birth-canal can be hastened which are not fraught with danger, and which should not be reserved for urgent cases. The complaint of pain, which will so strongly tempt a physician to prescribe narcotics, is the most distressing feature he has to encounter. The patient, however, should be diverted as much as possible from a consideration of her sufferings, while caution should be exercised that her strength does not become exhausted. She should be encouraged in first labors to remain up and about as long as possible, assuming any position most comfortable to herself. The nurse should see to it that the bladder and rectum are completely empty, and if any suspicion of a previous inflammation about the birth-canal exists, the patient should receive a vaginal douche of bichlorid of mercury, one to five thousand, or creolin, two per cent. Among the many drugs which have been given to mitigate the suffering of the first stage of labor, chloral hydrate and antipyrin are

most deserving of confidence. The first may be given in doses of fifteen grains, repeated hourly, until three or four doses have been taken. It may be conveniently administered by rectal injection, as the stomach of the patient is often sensitive at this time. Antipyrin may be given in doses of two and a half grains each, either dissolved in water, or in wafer or capsule. The writer's experience has shown him that larger doses than these of antipyrin result in delaying labor, while small doses frequently give the patient considerable comfort. The drug may be repeated three or four times at intervals of one or two hours.

In abnormal cases of labor, where it is feared that exhaustion may result from delay in the first stage, it is well to give the patient frequent hot douches. These should be rendered antiseptic by some substance which does not destroy the natural smoothness and slipperiness of the mucous membrane. A one per cent. solution of creolin will be found best adapted for this purpose. Carbolic acid, one per cent., or a very dilute solution of bichlorid of mercury, one to ten thousand, may also be employed.

In hospital practice, where the antecedents of patients are not known, it is well to give a preliminary douche of green soap and creolin, sufficiently strong to contain two per cent. of the antiseptic, before labor. The writer's experience in the Philadelphia Hospital and in the Jefferson Maternity has convinced him of the decided advantage to be gained by such an injection, either before or during the first stage of labor. With hospital patients a full bath, either in a tub, or if the patient's sufferings will not permit, by a sponge, should be invariably given, the external genital organs should be washed in bichlorid solution, one to two thousand, and if the membranes have ruptured, an antiseptic napkin should be worn until the physician's arrival. Should this stage be prolonged, care must be taken that the patient receives some

easily digested nourishment. Stimulants should be avoided unless exhaustion is actually threatened.

The physician should discriminate regarding the existence of delay in the first stage of labor from the inhibitory action of the sensation of pain. Thus, labor may begin, and after a short time the pains die away, the patient complaining of severe suffering which has gone to the point of nervous exhaustion. It will be well then to give the patient a full dose of some anodyne, putting her perfectly to sleep for a few hours, when labor may go on successfully. An injection of morphia, one-eighth of a grain, with atropia one two-hundredth, will usually be found best for this purpose.

When, however, the membranes rupture and the actual expulsion of the fetus begins, the part which the physician is to play becomes a more active one. The patient should then lie upon her left side upon a bed suitably prepared by the nurse, a pillow or blanket-roll between her knees, and her clothing should be so arranged that it may readily be changed after the birth of the child without great disturbance or fatigue. The physician should then examine the patient thoroughly to satisfy himself of the position and presentation. He should have at hand a basin containing a solution of bichlorid of mercury, one to two thousand, in which pieces of absorbent cotton or old linen are immersed; he needs also to have available Squibb's Fluid Extract of Ergot, brandy or whisky, a hypodermic syringe in good order, strychnia prepared for hypodermic injection, tincture of digitalis, and aromatic spirits of ammonia.

The ligature for the cord should have been previously prepared from silk or stout thread thoroughly antiseptized. The physician should have within easy reach a stethoscope, a pair of scissors suitable for cutting the cord, uterine dressing forceps and iodoform or creolin gauze, a small blunt-pointed bistoury, and a pair of hemostatic forceps. Beneath

the edge of the bed should be a receptacle into which soiled pieces of cotton or linen may be thrown, and also a suitable vessel for receiving the placenta.

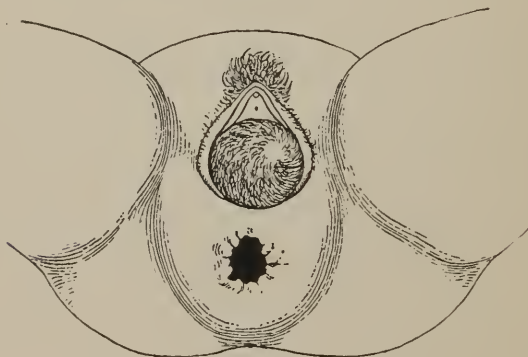
The question of anesthesia during normal labor is one admitting of difference of opinion and discussion, but the writer is convinced of the value of an anesthetic, given to a mild grade of anesthesia, in expediting labor, facilitating delivery, and reducing the tendency to laceration of the perineum. It is his custom to use chloroform and a mask composed of canton flannel stretched upon a wire frame (the Esmarch apparatus). This flannel may be readily removed and washed, and hence cleanliness in this respect can be easily secured.

As labor proceeds, the patient's requests for relief from suffering may be met by allowing a few drops of chloroform to fall upon the mask, and having her inhale sufficient to appreciate the odor without being affected by it. Should, however, it become evident that the patient's pains are so severe as to threaten exhaustion, it will be well to encourage her to inhale sufficient of the anesthetic to give her brief periods of repose between the pains. A sleep for three or four minutes thus obtained will often change a lingering to a speedily successful labor, and prevent the application of forceps.

When the head descends upon the pelvic floor, the physician must choose that form of support to the perineum which, in his judgment, best reduces the risks of laceration. The writer has no hesitation in stating his belief that by far the most efficient method of delivery is that taught so long in the Vienna Obstetric Clinics, and sometimes denominated "The Vienna Method." It consists in placing the right hand broadly extended upon the perineum, the curve of the posterior commissure being received in the space between the thumb and index finger; the left hand is placed between the

patient's thighs, and, as the head emerges, the fingers of the left hand in a semi-flexed condition grasp the vertex, holding it strongly upward beneath the pubic joint. Should the patient threaten to expel the child suddenly, either hand may be placed over the vulva, the other pressing upon it, and the strength of both arms is instantly available to check the too-rapid progress of labor. Care must be taken that the right hand does not obstruct the exit of the head, and thus favor laceration of the vagina and fascia about the vulva. A distance of an inch should be left exposed between the posterior

FIG. 47.



THE HEAD DISTENDING THE PERINEUM.

edge of the vulva at the fourchette and the upper edge of the hand which supports the pelvic floor. As a moderate laceration in the median line results in less damage to the supports of the uterus than radiating tears higher up, it is preferable to allow a medium tear of half an inch than to preserve the perineum at the expense of the fascia above. Such a tear is readily sutured, and heals promptly under antiseptic care.

As the head descends, the physician cleanses the perineum by means of the cotton or linen immersed in the antiseptic solu-

tion, dropping these pieces into the waste receptacle beneath the edge of the bed. At the moment of delivery, he requests that the patient inhale the anesthetic deeply to complete the transient anesthesia. Directing or maintaining the flexion of the head by the left hand, with the right he presses the head backward until a pain has ceased, and then at a favorable opportunity, having tested the elasticity of the perineum by allowing it to move back and forth under the right hand as the head descends, he slips it back over the head, allowing the head to be born between the pains.

FIG. 48.



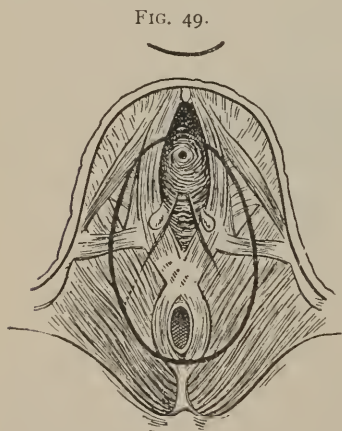
DELIVERING THE HEAD.

The nurse should have ready a solution of boracic acid and glycerin, with small bits of old linen, and as soon as the head is born, the eyes and mouth of the child should be cleansed with this material. During the brief pause which occurs between the expulsion of the head and the shoulders, the patient should be allowed to rouse partially from the anesthesia, although the vigilance of the physician should be in no way relaxed. His left hand should grasp the neck of the child, bending the child's trunk by a lateral flexion so

that the presenting shoulder, usually the lower, is prevented from plowing downward into the perineum. The right hand should still support the pelvic floor, and thus the delivery of the shoulders be managed upon the same principles applied to the birth of the head. The shoulders born, the anesthetic should be entirely suspended, and upon the expulsion of the child the nurse or physician should place a hand upon the fundus of the uterus, while the child is allowed to lie upon its right side until the pulsation of the cord has ceased. A temporary ligature may then be thrown about the cord three fingers' breadth from the umbilicus. If the child is asphyxiated, and haste is imperative, the cord may be

clamped by the hemostatic forceps, and cut without ligation. The child, when separated from the mother, is wrapped by the nurse, preferably in a woollen blanket, and when its respiration has been observed to be normal, it is placed aside until the time for its first bath.

In cases of excessive distention of the perineum, serious rupture may often be prevented by the simple procedure of episiotomy. This is effected by introducing a blunt-pointed bistoury, or a blade of a pair of blunt-pointed scissors, between the



EPISIOTOMY.

The dotted line on the patient's right shows the line of incision. The dark oval shows the amount of dilatation gained by episiotomy on both sides.

head and the edge of the vulva at the junction of the upper two-thirds with the lower third. The extent of such an incision will depend upon the degree of distention; but,

ordinarily speaking, from an inch to an inch and a half may be incised without danger. The blade of the knife should be turned up against the edge of the vulva at the occurrence of a pain, when the

tissues will separate, and the perineum can often be observed to retract to a remarkable extent over the presenting part. After delivery, these incisions should be stitched with fine catgut, plentifully powdered with boracic acid, aristol, or iodoform, when, as a rule, they heal promptly. The *serrefine* has been used in place of the suture with success. (Figs. 49 and 50.)

FIG. 50.



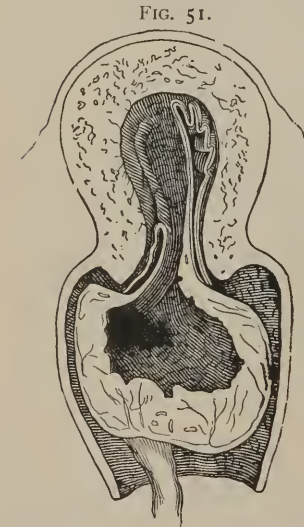
EPISIOTOMY KNIFE DEVISED BY THE WRITER.

CHAPTER XII.

THE THIRD STAGE OF LABOR.

Without narrating the many theories which have been formed regarding the separation and expulsion of the placenta, it seems in the present state of our knowledge to be the fact that the placenta separates from the wall of the

uterus by the intervention of a clot (Fig. 51). It is expelled from the uterus by the contractions of that organ, and especially by those of the abdominal muscles. The time normally occupied for the accomplishment of this is sufficient, first, to allow partial separation and the formation of a clot to occur ; and, second, to give the patient sufficient interval in which to recover consciousness, if she has been anesthetized, and to regain control of the diaphragm and abdominal muscles. When labor is accomplished without putting the patient entirely to sleep at the moment of birth



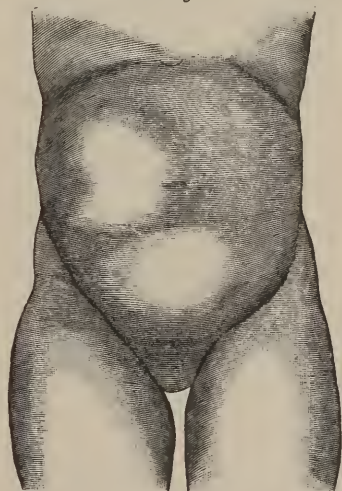
THE PLACENTA AND MEMBRANES.
After the expulsion of the fetus.

the placenta may follow within ten or fifteen minutes after the expulsion of the child. When, however, the patient is

exhausted or has been anesthetized, from half an hour to an hour may elapse before uterine contractions bring about the expulsion of the placenta (Fig. 51).

The question as to whether active interference is demanded must be determined by the presence or absence of hemorrhage and the consistence of the uterus as felt through the abdominal wall. If the uterus remains moderately firm and there be no hemorrhage, the practitioner should wait, if the labor has been normal, until the patient has had from twenty minutes to half an hour's rest, and is able to make voluntary expulsive efforts. The left hand should then be placed upon the fundus of the uterus, and that organ roused to contract by gentle friction with accompanying pressure in the axis of the pelvis. The right hand of the physician, having been freshly cleansed and antiseptized, should examine to ascertain the descent of the placenta. Usually a few vigorous contractions of the uterus and abdominal muscles will bring the edge of the placenta at the vulva within easy grasp by the physician. He should then fold it together with the thumb and fingers, and by a gentle rotary motion it will be felt to slip easily away, the membranes following it in a twisted cord. The nurse should hold a suitable receptacle between the patient's thighs, and thus the placenta may be transferred without exposure and

FIG. 52.

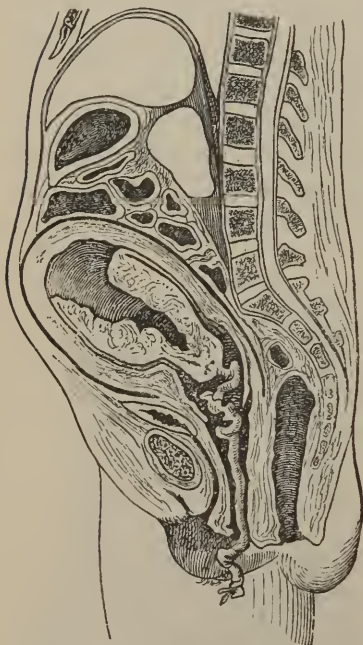


THE ABDOMEN AFTER THE FETUS IS BORN.

with but little soiling of the bed, and reserved for future examination (Figs. 53 and 54).

The attention of the physician should next be directed to the firmness or laxity of the uterus. In healthy, young primiparæ, the mechanism of the closure of the uterine sinuses

FIG. 53.



THE EXPULSION OF THE PLACENTA,
FETAL SURFACE FIRST.

FIG. 54.



THE PLACENTA IN THE LOWER
UTERINE SEGMENT.

is amply sufficient to guard against hemorrhage; but where repeated labors have weakened the uterus, or where it has been relaxed by protracted or abnormal labors, it is the part of caution to administer a teaspoonful of the Fluid Extract of Ergot. In some cases five grains of quinine will act more

efficiently than ergot. Where relaxation of the uterus is threatened, a thirtieth of a grain of sulphate of strychnia may be given hypodermatically to great advantage. In severe cases, where the effect of ergot must be obtained at once, it may be injected into the walls of the abdomen in doses of thirty minims. The patient should now be left in charge of the nurse to be properly cleansed.

The physician will have had opportunities during the progress of labor to be aware of the presence or absence of lacerations of the pelvic floor; if he is not satisfied as to their existence and their extent, he will do well, before leaving his patient, to examine thoroughly, and should sufficient laceration be found, and the condition of the patient permit, it should be closed at once. The question as to just what extent of median laceration of the perineum demands suture is a difficult one to answer. The sanitary regulations of some of the countries where midwives practice extensively under license require them to summon a physician to close a laceration of more than one-half or three-fourths of an inch. In hospital practice it is safe to say that all lacerations except those of the posterior commissure should be closed by sutures. Abrasions of the mucous membrane or stellate tears in the mucous membrane of the vagina should be heavily powdered with a suitable antiseptic substance. In hospital practice, iodoform is best; in private practice, where the odor of iodoform is so objectionable, powdered boracic acid or aristol may be employed to advantage. It will not infrequently be found that instead of a laceration of the perineum, the mucous membrane of the vagina may have been dissected up from the sub-mucous tissue for two or three inches at one side. If it can be done without too much suffering and inconvenience, it is well to close such a laceration.

The immediate closure of perineal injuries of slight extent

is comparatively a simple matter. Curved needles, needle-holder, and a pair of dissecting forceps, and a good quality of antiseptized silk or silk-worm gut will usually be sufficient. Silver wire is preferred by some, and the over and over stitch with catgut by others, but, as a rule, the average practitioner will do better with silk than with any other material. The principle of closure consists in simply bringing together lacerated surfaces, remembering that the stitch should go sufficiently deep to bring the wound together from the bottom. As to the time for the performance of this slight operation, if the patient and the physician be exhausted, if the light be poor, and the conditions unfavorable for closing a lacerated perineum, where labor has occurred during the night, it is well to wait four or eight or even twelve hours until the patient has become somewhat rested, and the physician can perform his duty under favorable circumstances. A great advantage in immediate closure is found in the fact that the tissues are less sensitive to pain than usual, but a mild degree of anesthesia will relieve the patient of suffering if the operation be deferred.

It is almost needless to say that the strictest antiseptic precautions should be observed in all cases of labor. After a normal labor the patient should be given one vaginal douche of bichlorid of mercury, one to five thousand. Further douches are superfluous and often injurious, unless complications arise. If, however, the patient has been lacerated and stitches have been inserted, she should have two and possibly three vaginal douches, in twenty-four hours, of bichlorid of mercury one to five or eight thousand, creolin 1 per cent., carbolic acid 2 per cent., thymol one to two thousand, or a saturated solution of boracic acid. Creolin douches are most useful in promoting the healing of lacerations. After the douche, the parts should be powdered well with iodoform or boracic acid.

After attending to the mother, the physician should examine the placenta and the membranes to assure himself that no part of them has been left within the uterus. He may also note any peculiarity about the placenta in form, size, weight, or the presence or absence of calcareous or fatty degeneration which may be present. The child should also claim his attention, and he may, at his leisure, grasping the cord at the umbilicus with the thumb and finger of the right hand and cutting it freshly at the ligature, strip or squeeze the cord from the umbilicus outward. A cord which is not rich in Wharton's jelly may not need stripping, but in all cases where the cord is large this procedure should be attempted. A convenient and useful method of dressing the cord is to powder it with salicylic acid one part, and starch five, or powdered boracic acid. It is then enveloped in absorbent cotton and placed upon the child's body, pressing gently against the trunk on one side of the umbilicus. A knit or flannel binder is then applied after the bath of the child, and the cord is thus protected from violence.

CHAPTER XIII.

THE TREATMENT OF ABNORMAL LABORS, THE HEAD PRESENTING.

The treatment of abnormal labors in head presentations must be directed to secure the conditions requisite for a normal mechanism of labor. These conditions are sufficient expulsive force on the side of the mother, the resistance of the pelvic floor, and the flexed position of the head.

As regards failure of the mother's expulsive forces, the most common example is lingering labor from weak pains. Delay from this cause is most often seen in poorly developed, neurotic primiparæ, in old primiparæ where the birth-canal is not easily dilated, and in multiparæ where the uterine and abdominal muscles have been so often distended that they have lost their elasticity and contractile power. The cessation of expulsive efforts, *before the membranes rupture*, is attended with little danger to the mother and none to the child. *After the membranes rupture*, both are in danger from protracted labor. The complete cessation of expulsive efforts after rupture of the membranes should give rise to the suspicion that the fetus and the birth-canal, in a head presentation, are disproportionate in size. It cannot be too strongly urged that only a preliminary examination by pelvimetry, palpation, and auscultation can enable an obstetrician to rationally conduct a case of even normal labor. When by such examination the pelvis has been found normal, the position and presentation are occipito-anterior, either left or right, and the head has engaged favorably, thus showing a normal proportion in the size of the fetus and birth canal, failure of the expulsive

forces before the membranes rupture is to be treated by anodynes and sedatives to secure rest ; by emptying bladder and rectum ; by small quantities of easily digested food, and by allowing the patient to assume such postures as conduce most to her comfort. Occasionally toughness of the membranes delays labor, when the obstetrician must rupture them ; but as a rule the membranes should be left to rupture spontaneously.

During the second stage of labor in these cases, failure of expulsive efforts is to be treated first by posture. By turning the patient on that side to which the presenting part is pointing, and flexing her thighs, descent and rotation will be facilitated. In addition, the uterine and abdominal muscles may be stimulated by friction. This is best done by commencing to rub the abdomen and gently knead the uterus when a pain begins, increasing the rate and vigor of manipulation as the pain advances. As the pain reaches its acme, pressure may be made in the axis of the pelvis and continued until uterine contraction abates. Drugs which experience has shown may be safely employed to stimulate expulsive efforts are the diffusible stimulants, as alcohol, tea, and coffee, and quinine. The last is advantageously given in capsules containing three grains of quinine and one or two grains of scale pepsin, a combination which does not usually excite the nausea so often seen at this time. The mother's expulsive efforts may be stimulated and encouraged by her coöperation, in fixing the diaphragm and bringing the necessary expulsive muscles into play, by pulling upon a sheet tied at the foot of the bed, or grasping the hand of an attendant. Whenever the sensation of pain is so acute as to inhibit expulsive muscular action, an anesthetic in small doses will allow the reflex mechanism of labor to proceed successfully. At the beginning of a pain the patient should be allowed to smell of the anesthetic ; at the height of the pain she may

experience its effects sufficiently to enable her to sleep for a few minutes when the pain has passed. In this way action and repose alternate, and progress continues.

An abnormal position of the head will be usually discovered when the membranes rupture, as the obstetrician should then thoroughly examine the patient. It can best be remedied by the insertion of the antiseptized hand, aided by the administration of an anesthetic. If the physician detects, early in labor, that the occiput is turned posteriorly, he will do well, before the membranes rupture, to place the patient upon the side toward which the occiput is pointing. By so doing, the fundus of the uterus is allowed to incline toward that side, and the rotation of the presenting part is favored by bringing the fetus more perfectly into the axis of the birth canal. As the head descends the hand may be used to push up the forehead and favor flexion. The expulsive forces of the mother should be conserved by the administration of tonics or stimulants, and should these forces fail the forceps is indicated. It must be remembered that labor, when the head turns posteriorly, is usually longer and more painful than normally, but it should also be borne in mind that nearly nine-tenths of these cases terminate spontaneously with an anterior rotation of the occiput.

When the occiput turns into the hollow of the sacrum, great caution is needed in attempting to complete delivery. A choice lies between the forceps and craniotomy, and should the child have perished, the latter, in skilful hands, is the better of the two procedures. The method of applying the forceps in these cases will be described under the general consideration of the use of this instrument.

The treatment of brow presentations consists in the endeavor with the antiseptized hand to convert a brow into an occipital presentation, with craniotomy should impaction and fetal death occur. Version in the early stages of labor,

when dilatation is complete, is also indicated in brow presentation when the pelvis is normal and the fetus proportionate in size.

Face presentations must be treated by securing as complete extension as possible, by retaining the membranes unruptured to the latest moment, and occasionally by the use of the forceps. When the head is turned transversely at the brim of the pelvis, causing the presentation of a parietal bone, the case demands most cautious treatment, and will be considered under the head of *The Treatment of Labor in Contracted Pelves*.

When a diagnosis of the exact position of the head has been made, great benefit may be derived from external pressure and manipulation. One hand should be placed behind the fundus of the uterus, and the other laid behind and above the symphysis upon the presenting portion of the fetus. By intelligent pressure before and during a pain flexion or extension and descent and rotation may be very noticeably promoted, and a halting mechanism in labor brought to a successful termination. Such manipulation is rendered most efficient by partial anesthesia.

CHAPTER XIV.

THE FORCEPS.

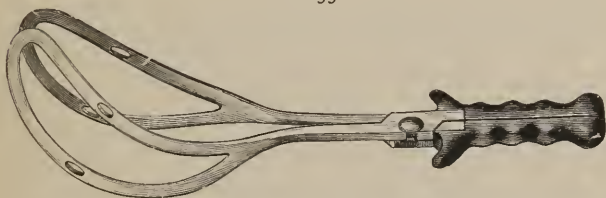
A frequent complication in labor, when the head is presenting, is failure of the mother's expulsive power, necessitating instrumental delivery. In the early days of obstetric science, such cases invariably terminated by the death of the child, and its mutilation and extraction by sharp hooks. When, however, the idea of blunting these hooks and converting them into a harmless tractor arose, the forceps was invented.

Its model was doubtless suggested by the shape of the hand about to grasp a round object like the head. It consists of two blades, named in accordance with the sides of the pelvis nearest which they lie, the left and the right. Each blade is composed of an expanded portion for grasping the head, an intermediate portion bearing some device for fastening the two blades together, and two handles—one at the extremity of each blade. The expanded portion for grasping the head resembles the hand rendered concave by flexion. This concavity gives to this portion of the forceps blade a curve called the Cephalic Curve, because it is intended to favor the approximation of the instrument to the head. From the tip of the expanded or head portion of the forceps blade to the handle the entire blade describes a curve somewhat resembling the axis of the pelvis. This is called the Pelvic Curve of the forceps.

In the center of the cephalic portion of the forceps blade is an ovoid aperture called the Fenestra of the blade. The device for fastening the forceps blades together, called the

lock, consists in some instruments of a large screw with thumb-piece by which the upper can be fastened firmly to the lower blade; in others, of a button-like knob placed upon the lower blade, while a niche in the upper blade receives the stem of the button when the blades are brought together; the lock may also consist of a loosely-fitting joint formed by a niche in the lower blade receiving a loosely-fitting ledge upon the upper. The lock most frequently in use is the last, which is exemplified in the Simpson forceps. The material of which the forceps is made is tempered steel, plated with nickle; the handles are often of hard rubber, darkly-stained wood, and, occasionally, of metal entirely, the purpose of the

FIG. 55.



DAVIS FORCEPS, PERFORATED FOR AXIS-TRACTION TAPES.

last being to avoid corrugations, which in wooden handles may give lodgment to septic material.

Forceps are divided commonly into long and short, the long being, as the name implies, several inches greater in length than the short forceps. The various modifications of this instrument are so many that only those most in use will be mentioned, and especially those whose merits have been proven by personal experience. Forceps may be divided into two classes as constructed with direct reference to the manner of application. For example, the Simpson forceps, one of the most commonly used, is constructed to be applied to the sides of the pelvis without regard to the rotated or

unrotated position of the head. On the other hand, the Davis forceps was shaped to be applied to the sides of the child's head. Various other instruments are intermediate in construction, but each is made with some reference to this manner of application (Fig. 55).

The indications for the use of the forceps are, danger to the life of the mother or child, or both, arising through delay in labor. Occasionally, in precipitate labor, the head may be so grasped and its progress controlled by the forceps as to render the birth a normal one so far as the rate at which the child is expelled is concerned. While the forceps has powers as a lever, compressor, and rotator, yet these are secondary and accidental, and its chief and important function is that of a tractor.

The conditions under which the forceps may be safely applied are a vertex presentation, very rarely a presentation of the breech or face. The size of the child should be proportionate to that of the birth-canal of the mother, the folly of attempting to drag a large head through a small pelvis being self-evident. The birth-canal must be dilated, and the fetal membranes must have ruptured.

The dangers attending the use of forceps are laceration of the maternal tissues, laceration of the child's scalp, compression and injury of the child's brain, and the increased risk of septic infection accompanying the use of instruments. Although this instrument, improperly used, is one of the most dangerous to mother and child, yet its proper employment, under antiseptic precautions, does not increase the mortality and morbidity of labor beyond a very slight extent.

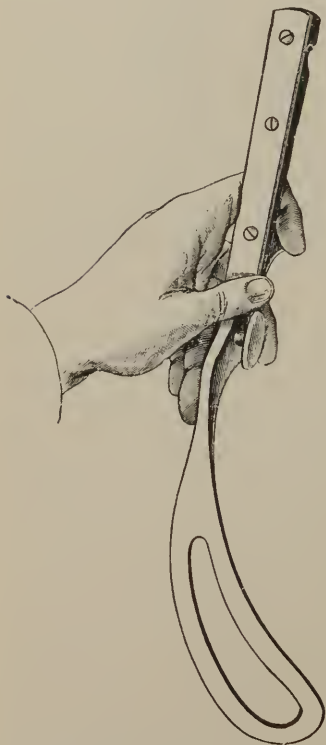
The first and simplest complication of labor for which the forceps may be employed occurs when the vertex presents; rotation has occurred; the head has descended to the pelvic floor, but the mother's expulsive forces failing, the life of the child is threatened through asphyxia, and the mother's

tissues are in danger through pressure, while her strength is well-nigh exhausted. The application of the forceps under such circumstances is known as the Low-application or Low-forceps-operation, because the head is resting upon the pelvic floor when the instrument is applied. Danger to the fetus in such a case is recognized by weakness of the fetal heart, with rapid beating, and sometimes a much diminished frequency in cardiac action. Danger to the mother in such a case can be diagnosticated by her exhausted condition, rise in her temperature, rapidity of her pulse-rate, and a dry and swollen condition of the birth-canal. A careful physician, however, will not wait until the conditions mentioned are present in the birth-canal, but will interfere when the other indications exist.

To apply the forceps, the patient is placed upon her back across a bed, her hips brought to the edge of the bed, and her feet in chairs. Some prefer to place the patient upon her side, usually upon the left side. Where the head delays at the brim of the pelvis and the forceps must be applied high in the birth-canal, the lateral posture is valuable, affording, as it does, the best opportunity for axis traction. An antiseptic douche should be given before the application of the instrument, and the physician should be sure that the bladder and rectum are empty. In primiparæ an anesthetic should always be administered; in multiparæ it is sometimes possible to avoid anesthetizing the patient. The physician should prepare his instrument by dipping it in hot water, washing it carefully in soap and hot water, rinsing it thoroughly; the forceps should then be placed conveniently in a pitcher of a hot antiseptic solution, creolin two per cent., carbolic acid two and a half per cent., being convenient. The instrument may be lubricated by slightly smearing the outer surface with some antiseptic ointment or with carbolized oil. The physician should then place himself directly opposite his

patient, so that he can appreciate any deviation from the central line of her body. The left blade of the forceps, or lower blade, is to be inserted first; the hands having been

FIG. 56.



THE LEFT HAND GRASPING THE
LEFT FORCEPS BLADE.

thoroughly cleansed and antiseptized, the fingers of the right hand should be introduced into the vagina between the head and the wall of the birth-canal; grasping the left blade of the instrument at its center with the left hand, the physician gently inserts the left blade guided by the fingers of the right hand. (Fig. 57.) To facilitate introduction, the left blade should be held with its handle parallel with Poupart's ligament of the right side; the thumb of the right hand gently pushes against the posterior surface of the cephalic portion of the blade, the instrument gliding gently between the head and the fingers of the right hand. (Fig. 57.) When properly applied, the forceps blade slips in almost imperceptibly; the handle of the blade will tend naturally to drop toward the floor, and should be held

by an assistant. The fingers of the left hand having next been introduced as a guard, the right blade should be grasped in the right hand of the physician, and inserted toward the

right side of the mother's pelvis. If it fits easily over the head, an effort may then be made to lock the blades by allowing the right or upper blade to fit down upon the left, and the parts of whatever lock may be present to adapt themselves to each other. If the forceps will not lock easily, the blades should be slightly shifted with great gentleness until they lock easily.

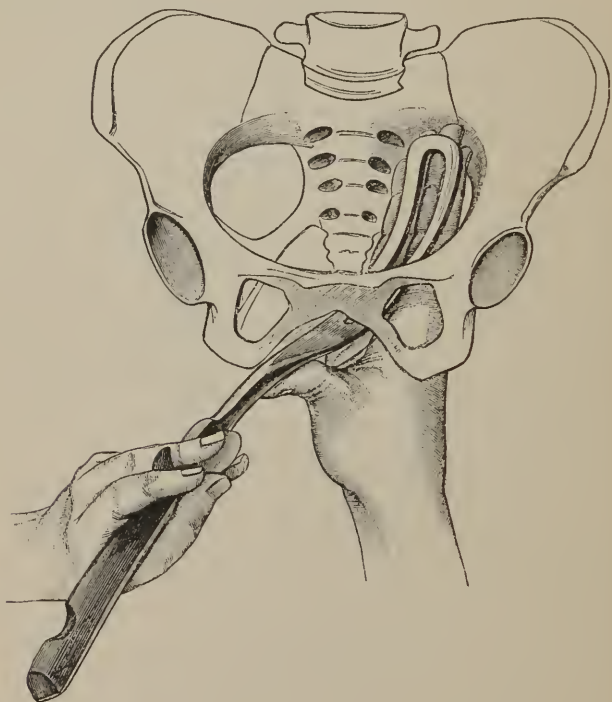
Locking having been accomplished, the physician may then with gentle traction try to move the head. A very moderate force, such as that exercised by the forearms of the operator only, is all that it is safe to use. Traction should imitate so far as possible uterine contractions and the normal expulsive efforts of the mother. If the mother be conscious, she should be urged to "bear down," and traction by the forceps should be simultaneous with her effort. If she be anesthetized, traction may be made every five or ten minutes as the case demands. In simple cases such as that under consideration, the force should be directed first slightly downward, then directly outward, and, last, upward. By this means the occiput will be brought out from beneath the pubic joint; traction directly outward should then follow until the head begins to distend the perineum. By this means the occiput will have emerged from beneath the pubic joint, and will be distending the vulva. Traction should then be almost directly upward, when the head will be delivered over the perineum.

In this way the natural mechanism of labor is imitated, and laceration of the perineum through downward pressure of the head may often be prevented. The simple procedure of episiotomy, to which reference has already been made, is especially well adapted to such cases.

After the delivery of the head, the shoulders will usually follow if the uterus be roused to contraction by friction. After delivery, the patient should receive a thorough douche of bichlorid of mercury one to five thousand, and any

slight laceration should be thoroughly dusted with an anti-septic powder. Although lacerations very frequently occur when the forceps is used, yet in many cases a laceration is

FIG. 57.



THE INTRODUCTION OF THE LEFT BLADE COMPLETED.

prevented through the better control of the presenting part afforded the practitioner by his instrument (Fig. 58).

In other countries the patient is usually placed upon the side during forceps delivery, although the position upon the back is the favorite one in America. The low-forceps opera-

tion, or use of the instrument when the head is upon the pelvic floor, is a comparatively simple and safe procedure. When, however, the head has not rotated, and especially if the head

FIG. 58.



PROTECTION OF THE PERINEUM IN FORCEPS DELIVERY.

Patient upon the left side.

be situated at the brim of the pelvis, the application of the forceps is a difficult and dangerous manipulation.

Although axis traction by instruments or appliances especially designed for that purpose is not necessary in the low operation with forceps, yet traction downward and backward is essential to bring the head from behind the symphysis. This may be accomplished by tape passed through the fenestræ or by pressing strongly downward and backward with one hand placed upon the forceps at the back, while the other hand, grasping the handles, makes traction and raises them strongly.

When assistance is available, pressure downward and backward behind the pubes is of service.

CHAPTER XV.

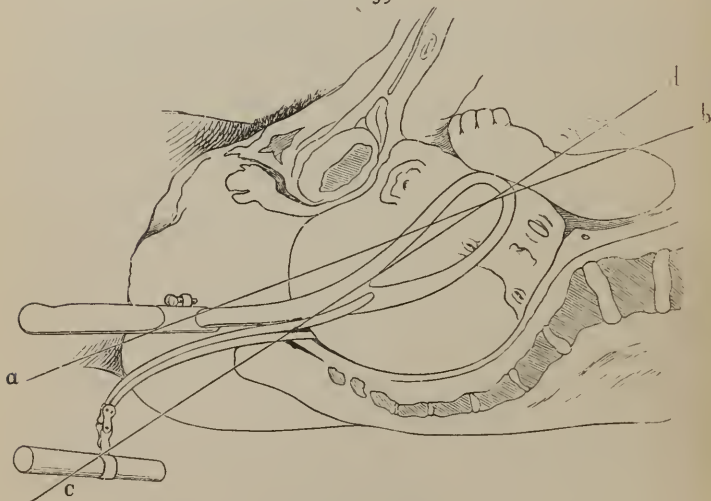
THE APPLICATION OF THE FORCEPS AT THE BRIM OF THE PELVIS: AXIS TRACTION.

Any one who has ever introduced the instrument, both blades being in position and locked, into the pelvis of a skeleton so high that he could grasp a head situated at the brim of the pelvis, must have observed that when traction was begun with the forceps so applied, the result was either failure to cause the head to descend, or its extraction with great difficulty. If the cause for such difficulty was sought, it was found that when the forceps was turned strongly forward, the tips of the cephalic portions of the blades impinged against the walls of the pelvis, and progress became impossible. In a living patient, the lining membrane of the birth-canal would have been badly lacerated by such an effort. If, however, a piece of tape be passed through the fenestræ of the forceps, and when introduced to the brim of the pelvis, traction be made downward and backward by pulling upon the tape, this difficulty is avoided, and a comparatively easy traction will result. Remembering that the direction of the axis of the birth-canal is downward and backward until the pelvic floor is reached, when it is deflected upward and forward, it will be seen that traction in this direction may be appropriately termed axis traction (Fig. 59).

Any forceps fitted with a device for performing this maneuver, namely, pulling downward and backward when the forceps is applied at the brim of the pelvis, is an axis-traction-forceps. The more elaborate of these instruments possess metal tractors hinged upon the cephalic portion of the blade,

which are not detachable. The simpler axis-traction forceps have some convenient device for the accomplishment of this purpose, by which traction is generally made with tape or bandage, the whole being easily attached or disconnected. Of the first class are the elaborate instruments of Tarnier, Simpson, and Breus, and their modifications. The latter form of instrument is well represented by the tape attachment devised

FIG. 59.



AXIS TRACTION.

a b. Traction with the ordinary forceps. *c d.* Traction with the axis-traction forceps.

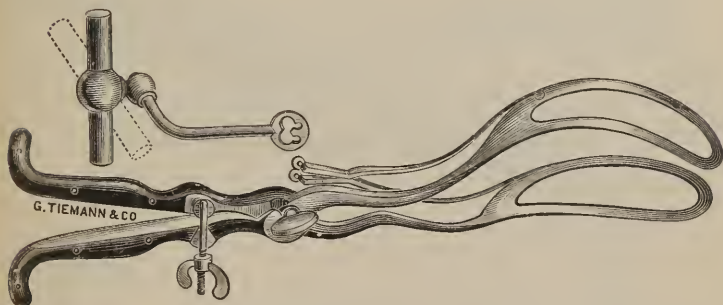
for the forceps by Poulet, which may be applied to any ordinary pair.

If we consider the best means of promoting flexion in cases in which rotation is deficient, we shall see that traction in the axis of the pelvis is among the most valued of resources. The axis-traction forceps then is especially valuable in this complication, and hence it is that posterior rotations of the occiput and defective rotations are often best treated by axis-

traction. An equal advantage in face presentations is often gained by the use of such an instrument in the ability to secure perfect extension. In these cases a narrow-bladed forceps, sometimes straight, has been found useful in drawing down the face and favoring anterior rotation of the chin. When the chin is posterior, in a few instances this procedure has been successful in securing delivery.

Before proceeding to consider the application of the forceps at the brim of the pelvis, we may be allowed to repeat that the case already described is the simplest condition calling for the use of this instrument, namely, failure in expulsive force,

FIG. 60.



LUSK'S TARNIER'S AXIS-TRACTION FORCEPS.

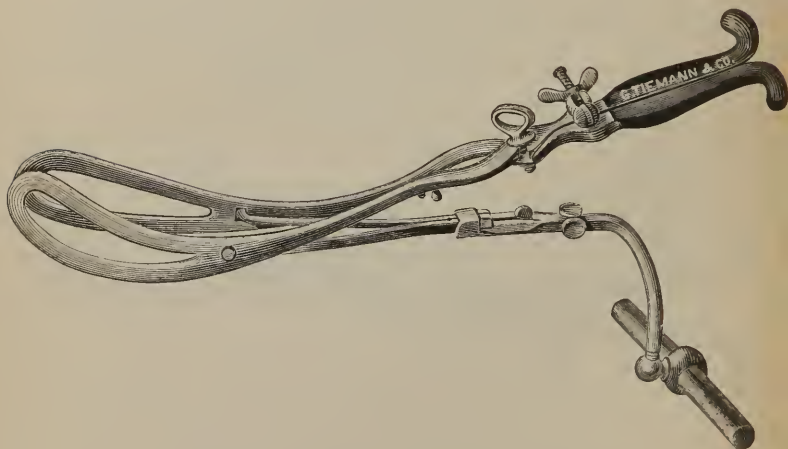
the occiput presenting and having rotated anteriorly, the head resting upon the pelvic floor, the child being proportionate in size to the pelvis; the function of the forceps is simply to imitate the mechanism of the last portion of the second stage of labor. The dangers attending its use in such a case are undue compression of the fetal head and laceration of the perineum and pelvic floor.

We next proceed to the more serious conditions requiring the use of the instrument, namely, the expulsive forces of the mother failing before the head has descended to the pelvic

floor while rotation is as yet incomplete, and in cases in which, oftentimes, the child is not proportionate in size to the mother's pelvis. The use of forceps in face presentation and when the child presents by the breech is comparatively rare, except in cases of these presentations in which the presenting part has passed the brim of the pelvis and begun to press upon the pelvic floor.

It not infrequently happens that the mother's strength

FIG. 61.



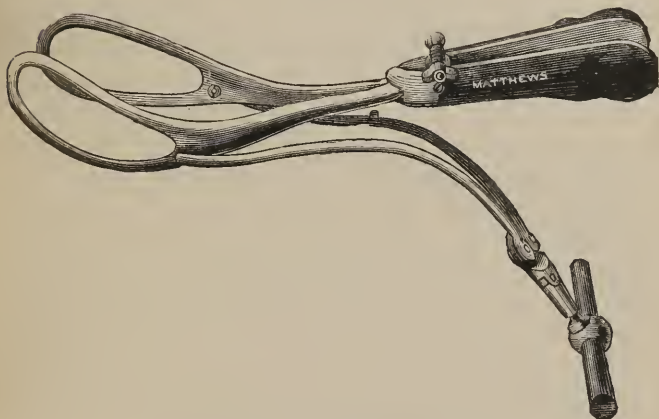
TARNIER'S LATEST AXIS-TRACTION FORCEPS.

becomes exhausted when the head has engaged at the brim of the pelvis and before descent and rotation have occurred. In such cases the dangers of exhaustion and fetal death are greater than in the cases just described, as are the risks of injury to the mother by the instrument itself.

The two classes of instruments already described were designed with a special reference to these cases. Thus the Tarnier axis-traction forceps and the Simpson long-axis-trac-

tion forceps represent two theories of application (Fig. 59). In the first, the operator endeavors to apply the forceps accurately to the sides of the head; the instrument is firmly secured in its grasp of the fetal head, traction is made in the axis of the pelvis, and the instrument and the head are allowed to rotate together (Fig. 61). In the use of the second instrument mentioned, the forceps is applied to the sides of the pelvis and in the pelvic axis, grasping the head as it conveniently can. Intermittent traction is then made

FIG. 62.



SIMPSON'S AXIS-TRACTION FORCEPS.

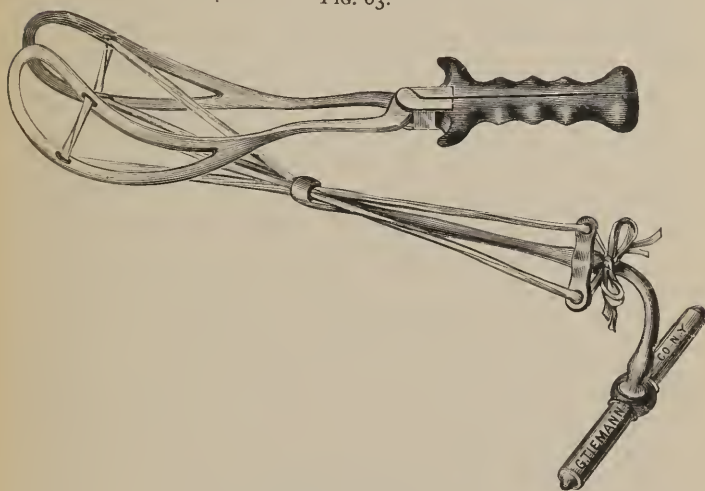
in imitation of labor pains and between the tractions the blades are slightly separated, and the head is allowed to rotate by degrees until, by the time the pelvic floor is reached, it has fitted itself gradually to the instrument (Fig. 62).

The first method of application is the more difficult, but is the more exact, and should be practised whenever possible; the second is comparatively easy, but requires discrimination and skill in favoring the rotation of the head. We have em-

ployed for some time, in axis-traction in cases where the Tarnier's forceps could not be readily applied to the sides of the head, the ordinary Simpson forceps, to which we have adapted the tape attachment of Poulet. A brief description of the method of adapting these tapes is as follows : The blade of the forceps is made in its cephalic extremity a little heavier than ordinary, the fenestra of the blade measures four and one-half inches in length ; two and one-half inches from the cephalic end an aperture is made in each limb of the blade surrounding the fenestra one-quarter of an inch in length, one-eighth of an inch in width ; this aperture is so beveled as to present no sharp surface ; through it is passed a piece of strong linen tape one-half inch in width, inserted from within outward through one aperture, and then from without inward through the other ; each piece of tape is one yard long, or eighteen inches after it has been doubled by passing through the forceps blade ; the tapes are received in a traction bar consisting of a straight portion eight inches long curving downward a distance of four inches, and terminating in a rotary traction handle ; just before the traction bar curves downward, it has upon the upper surface a cross-piece, two and one-quarter inches long, which has at each end an aperture for making fast the tapes ; the end of the traction bar which is nearest the mother has a rim of metal through which the tapes pass to be tied into the apertures ; the forceps is applied to the sides of the pelvis in the usual manner, the tape being held along the blade by the obstetrician and the instrument being first introduced on the left side of the mother, as is customary ; care is taken that the tape rests between the forceps blade and the head of the child ; the tapes are then passed through the ring of the traction bar, passing below the locked forceps, and are made secure at the cross piece ; to prevent cutting the perineum and posterior wall of the vagina, Sims' speculum or any suitable depressor or guard may be used.

It has been found by experience that a special screw for holding these forceps firmly locked is not necessary; extraction is made with one hand, while with the other the forceps is grasped as usual and easily held and applied to the head; the pull upon the tapes is such as to tend to keep the forceps tightly applied to the head instead of drawing the blades apart. We are accustomed to carry the tape and traction bar with us, using the forceps without them when axis trac-

FIG. 63.



SIMPSON'S FORCEPS,
With Poulet Tape Attachment for Axis-Traction.

tion is not necessary. The fact that this attachment can be fitted to any forceps with which the practitioner is familiar, its little cost compared with expensive axis-traction instruments, the ease with which it is cleaned and carried in the regular obstetric bag, have made the instrument a very convenient one in our hands (Fig. 63).

The high forceps operation, or the application of the

instrument at the brim of the pelvis, is admissible only when the child is proportionate in size to the birth-canal of the mother; when the head has at least partially engaged at the brim of the pelvis; when there exists no obstacle to delivery in the center of the bony pelvis and at the pelvic floor; when the membranes have ruptured, and, as is the rule in these cases, when mother or child, or both, are in danger from delay.

While it is sometimes possible in the simple or low forceps operation to perform delivery without changing materially the patient's position, in the application of forceps to the head at the brim of the pelvis, the patient must be brought to the edge of the bed or table, either upon her back or side, her hips projecting over the edge sufficiently far to enable traction to be made in the axis of the pelvis. An anesthetic is nearly always indispensable. As in all obstetric operations, the bladder and rectum should be thoroughly emptied, and means should be at hand for promptly resuscitating the child. In selecting an instrument, the average practitioner will do better with one to which he is accustomed than with a strange, although possibly superior, instrument. The patient being anesthetized, a thorough examination should be made to determine as far as possible the exact position of the head. If necessary, the hand should be inserted in the vagina and the head accurately located, its exact position being clearly recognized. It is impossible to make an accurate diagnosis in these cases with one or two fingers only. If the operator purposes to apply the forceps to the sides of the pelvis, the blades may then be introduced as usual in the pelvic axis, and passed in sufficiently far to grasp the head. If the instrument is selected to fit upon the sides of the head, especial care should be taken to apply and secure it in the proper manner.

With the former, traction should be made downward and

backward at intervals resembling as far as possible the contractions of the uterus during labor. Between the tractions the grasp of the forceps should be slightly relaxed to afford the head an opportunity to rotate. As the head descends, especial care should be taken when the pelvic floor is reached to relax the forceps more than in the earlier traction. It will be remembered that it is not until the pelvic floor is reached that rotation occurs, and hence the necessity for allowing the head greater freedom at this time. If the Poulet tapes, or some of the detachable rods for axis traction which have been devised and found valuable, are used, they can be disconnected from the traction bar after the pelvic floor is reached, and the head delivered as in an ordinary application at the pelvic floor. If the axis-traction forceps with non-detachable traction bars are used, these bars may be folded up upon the shank of the forceps when no longer in use.

In applying axis-traction forceps to the sides of the head, care should be taken to clamp them sufficiently to secure a firm hold. Traction, however, should be made as in the former case, in the axis of the pelvis toward the median line. The use of the forceps as a rotator is a secondary, and not a primary employment of the instrument. The forceps and head must rotate together when the instrument is applied to the sides of the head; but the rotation must be effected by traction in the axis of the pelvis, and not by forcible rotary movements. Compression and leverage are also secondary functions of the forceps; but the operator should not purposely compress the head to any great extent, nor pry it loose from an impacted position. Only such compression and leverage as are incidental to the securing of a firm grasp and making traction in the axis of the pelvis are admissible.

Research has shown that the diameters of the fetal head are lessened in some directions and enlarged in others by pressure with forceps. If the forceps is so applied that either a

transverse or antero-posterior diameter be lessened, the vertical diameter may be slightly increased without serious damage. In normal labor such increase takes place through the projecting of the parietal bones at the sagittal suture, and this may be imitated during forceps delivery. A physiological pressure upon the fetal head may be said to be such as would force cerebro-spinal fluid from the ventricular spaces of the brain into those of the cord, and *vice versa*, thus temporarily lessening the volume of one portion of the cerebro-spinal nervous axis at the temporary expense of the other. The writer has observed, after several cases of forceps delivery where the death of the child resulted within a week or ten days, patches of cerebral softening not resembling those occasioned by embolism, but apparently resulting from pressure.

When the head does not engage at the brim of the pelvis, as a rule the forceps should not be applied. Version, or some other obstetric operation, is then indicated. Pressure and external manipulation under anesthesia will often bring the head to engage and render possible the application of the forceps.

A method of obtaining axis-traction, sometimes useful, consists in passing a piece of tape through the fenestræ of the blades sufficiently long to reach nearly to the floor. The tapes are then tied together while the operator makes traction by the handles; the loop of tape is passed about his foot, and downward pressure in this way reinforces the usual methods of traction.

THE USE OF THE FORCEPS IN POSTERIOR ROTATION OF THE OCCIPUT.—In occipito-posterior positions, it will be remembered that, as a rule, rotation occurs when the head reaches the pelvic floor. To secure this end, however, the expulsive forces of the mother must be good, and the resistance of the pelvic floor be also considerable. Flexion of the head must be present to secure this result. The use of the forceps in

these cases is to promote flexion and aid the descent of the head. For this purpose axis-traction is desirable. The instrument most appropriate is that of Simpson, or some modification, which leaves the head free to rotate as labor progresses.

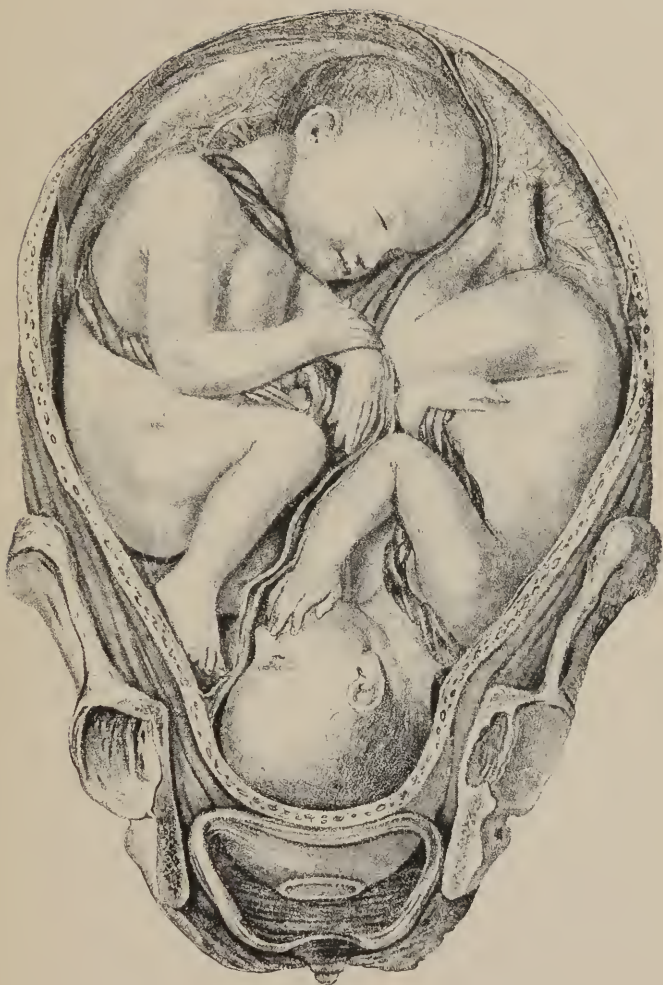
When, however, the occiput is turned directly backward into the hollow of the sacrum, axis-traction is still advantageous, and delivery can usually be secured by applying the instrument to the sides of the head, and making traction directly outward and slightly downward until the forehead of the child begins to appear beneath the pubic joint. The grasp of the instrument should then be relaxed, the handles should be slightly lowered, and a fresh grasp obtained. A movement of flexion should then be performed by the forceps, the handles being slowly raised to allow the occiput to pass over the perineum. In such cases, laceration of the perineum usually occurs, is generally considerable in extent, and sometimes complete.

THE FORCEPS IN FACE PRESENTATIONS.—The best authorities agree that the application of the forceps in face presentation is not to be commended. It is true that a narrow-bladed straight instrument has been employed on several occasions successfully, securing perfect extension, and favoring the rotation of the chin anteriorly. As a rule, however, the use of the instrument results in such injury to the child and the mother as to render version a far more desirable expedient.

THE FORCEPS APPLIED TO THE BREECH.—In cases of breech presentation where the progress of labor is slow, it has been found possible to favor descent by applying the forceps in such a way that the trochanter of each side should fit into the fenestra of each blade. If the instrument is applied in any other manner, serious injury may be done through pressure of the tips of the blades upon the abdomen of the child. Traction in the pelvic axis should be made.

MORBIDITY AND MORTALITY CAUSED BY THE FORCEPS.—When the indications for the use of the forceps are intelligently comprehended, and the instrument is rationally employed with strict antiseptic precautions, its use does not increase the maternal morbidity and mortality of labor, but under other conditions a very considerable increase in both occurs. The injuries most common to the fetus from the forceps are bruising and laceration of the scalp, fractures of the cranium and face, and injuries to the brain through pressure. It occasionally happens that very extensive laceration of the scalp occurs, followed by sloughing after birth. Fractures of the cranium and bones of the face are rarely fatal of themselves, and are serious in proportion as they are accompanied by injuries to the brain through pressure. Fracture of the jaw rarely occurs and will often recover perfectly without the application of a splint. Paralysis of the facial nerve by pressure upon the trunk soon after it emerges from its foramen is not uncommon, but is usually temporary in character. Pressure upon the brain may produce limited areas of softening as already described, and even death from extensive injury to the vital centers. Although it has been believed that idiocy is often the result of pressure by forceps, yet proof of this is wanting in the majority of cases, while a casual relation between forceps delivery and epilepsy is also not proven.

Vesico-vaginal fistulæ are rarely caused by forceps, but by the pressure of the head which the forceps would have relieved. Fistulæ following labor are rare where forceps are skilfully employed, and without delay.



UTERUS WITH TWINS IN CRANIAL AND BREECH PRESENTATION
(TWO OVA). (*Smellie.*)

CHAPTER XVI.

LABOR IN BREECH PRESENTATIONS.

A breech presentation may be diagnosticated before labor by feeling the fetal head in the upper portion of the abdomen, by hearing the fetal heart sounds at or above the umbilicus, by detecting at the brim of the pelvis a body less round and hard than the head, and by mapping out the fetal limbs. At labor, such a presentation will be suspected when the head cannot be recognized as the presenting part by its hardness and globular outline; a diagnosis can be made with certainty when the thighs of the child can be felt, and their relative position to the trunk be recognized.

The natural course of labor in breech presentation is more prolonged than when the head presents, because the breech is inferior, as a dilator of the birth-canal, to the head, and also because delay is apt to occur in the descent and delivery of the after-coming head. Nature endeavors in these cases to retain the membranes unbroken as long as possible, thus securing thorough dilatation (Fig. 64).

The positions of breech presentation are designated by selecting the posterior surface of the sacrum as the cardinal point upon the fetus. In the first breech presentation, the back of the fetus is toward the left side of the mother, the posterior surface of the sacrum being opposite the left ilio-pectineal eminence. The diameter of the fetal body principally concerned in the mechanism of the engagement and descent of the breech is the bis-trochanteric, extending from one trochanter to the other, measuring three and three-quarter inches, or nine and five-tenths centimeters. When labor

occurs in the first position, this bis-trochanteric diameter engages in the left oblique of the pelvis. The body of the child descends into the pelvic cavity, and the anterior hip, in this case the left, rotates forward under the pubes. If the child be small and the birth-canal capacious, the hips may emerge diagonally across the outlet of the pelvis. The body is bent slightly upon itself by lateral flexion as it emerges.

FIG. 64.



BREECH PRESENTATION, THE LEGS EXTENDED.

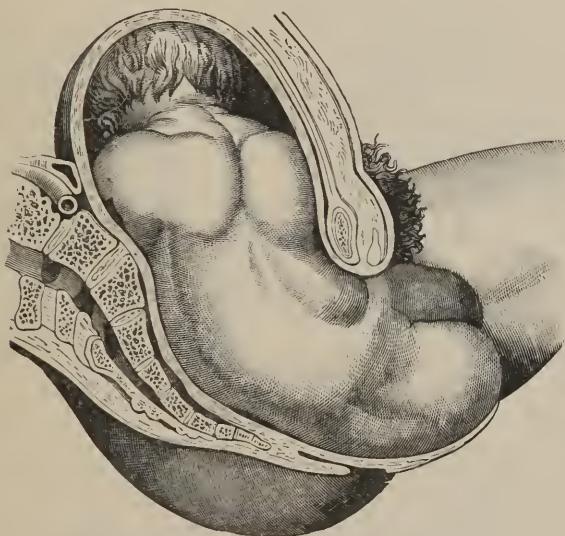
First Position.

In normal cases the arms of the child remain folded across its breast. The left shoulder of the child engages first under the pubic joint, and pivots beneath the articulation, while the right shoulder sweeps over the perineum. The back of the child then turning anteriorly, if flexion be complete, the chin emerges closely approximated to the breast, and the occiput pivots beneath the pubic joint, flexion continuing, the head

passes over the perineum from the chin to the occiput successively by a motion of perfect flexion. When the back of the child rotates posteriorly toward the back of the mother, the chin often pivots behind the pubic joint, and delivery may take place by expulsion with strong extension (Figs. 62 and 63).

When the back of the child is toward the right side of the

FIG. 65.



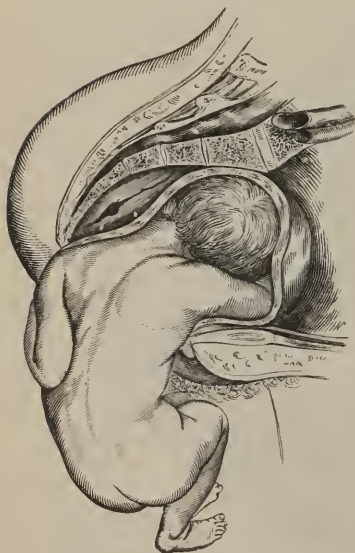
DESCENT OF THE TRUNK, BREECH PRESENTATION,
Second Position.

mother in the second position of breech presentation, the mechanism is the same, with a reversal in the direction of the rotation.

The treatment of breech presentations requires, so far as possible, very early recognition of the presentation. It is of especial importance whenever the obstetrician detects an ab-

normal presentation that the membranes be not ruptured until the very last moment. One of the dangers to which the child is exposed in abnormal presentations arises from the defective dilatation of the os and cervix, which contract about the head and neck of the fetus at the moment of delivery, often causing death by asphyxia. This is especially

FIG. 66.



THE SHOULDERS EMERGING,
BREECH PRESENTATION.
Second Position.

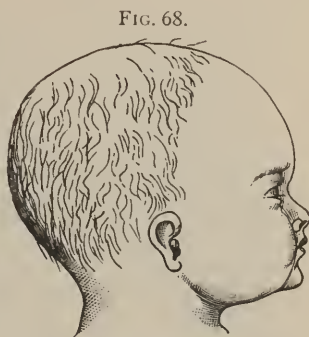
FIG. 67.



EXPULSION OF THE HEAD IN
BREECH CASES.

true in labor with breech presentations, in which the head, coming last, is exposed to pressure and resistance from an imperfectly dilated birth-canal. The membranes, then, should be retained until the breech has descended, and oftentimes until the membranes begin to protrude at the vulva (Figs. 66 and 67).

In a simple case of labor with breech presentation, the obstetrician should avoid hastening the descent of the trunk. Traction carelessly made upon the hips and limbs will often cause the ascent of the arms to the sides of the head, seriously complicating its delivery. The descent of the trunk may be most advantageously aided by pressure upon the fundus of the uterus, and such manipulation as shall tend to maintain a flexed position of the head and keep the bones from becoming extended. If the position



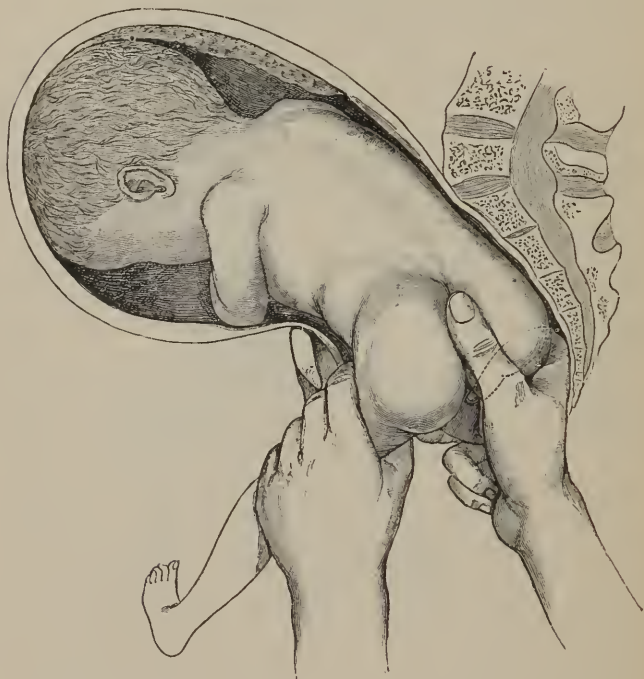
HEAD BORN IN BREECH LABOR.

and presentation have been clearly mapped out by palpation such manipulation can be most judiciously employed. An assistant can often render valuable service by hooking one or two fingers into the fetal groin and making traction during pains, while abdominal manipulation is employed at the same time. As the breech emerges, the wedge formed by the breech and flexed thighs will be gradually decomposed, and the limbs will become gradually extended. It occasionally happens that descent of the limbs is present from the beginning of labor, constituting what is often known as a "footling case." As the body of the child descends the physician should support it with his hand, or with a warm towel, standing ready to raise the body of the child toward the mother's abdomen with one hand, while making prompt and energetic pressure over the uterus behind the pubic joint with the other at the moment the head emerges. These two simple maneuvers will result in the prompt expulsion of the head in uncomplicated cases. If an anesthetic has been used, its administration should be discontinued before the head

reaches the pelvic floor, so that the mother's conscious efforts may be solicited at the critical moment when the head is passing (Figs. 69 and 70).

It is well in all breech cases to have at hand the forceps

FIG. 69.



BRINGING DOWN THE HIPS IN A DELAYED BREECH LABOR.

ready for instant use, and also appliances for resuscitating an asphyxiated child. Of the latter the warm bath, accompanied by a fine stream of cold water directed upon the chest, is the best. It is well to have a small English catheter

which may be introduced into the trachea should direct inflation of the lungs be necessary.

FIG. 70.

In the majority of cases an asphyxiated child in whom circulation persists can be resuscitated by placing it in a hot bath, directing a fine stream of cold water upon its chest and making passive respiratory movements. The application of cold water should be brief, and the stream should be so fine as to resemble a jet of spray. The entrance of air into the fetal chest can be secured by Schultze's method of inflation. The fetus is grasped by both hands, the palmar surfaces on the scapulæ, the thumbs on the sternum, the head between the hands. The body is then raised until the legs



BRINGING DOWN THE TRUNK IN BREECH CASES.

drop over the physician's head ; it is swung gently outward and forward, in the arc of a circle, until it almost touches the floor. Expiration occurs during ascent ; inspiration during descent. Should the heart's action fail, digitalis or strychnia, given by hypodermic injections, and the application of heat are often useful. The precaution should always be taken to remove mucus from the child's mouth and fauces with a bit of soft, old linen dipped in a solution of boracic acid.

FIG. 71.



THE ARMS BESIDE THE HEAD.

When the arms of the fetus have become extended beside the head, the physician must liberate them and bring them down. To accomplish this, the thighs of the child are grasped, we will say, by the left hand ; downward traction in first made upon the body, and then the trunk is bent strongly toward the mother's right side and obliquely upward and outward. The index and middle finger of the right hand are then passed over the child's right scapula, and

along the upper surface of the humerus, until the bend of the elbow is reached. The fetal arm is then flexed at the elbow and carried downward and across the child's chest,

FIG. 72.



THE ARMS BESIDE THE HEAD.

when it easily drops into the vagina. Grasping the thighs with the right hand, the body is then carried obliquely upward toward the mother's left side, and the left arm of the fetus is liberated by the left hand of the physician.

The arms having been delivered, an effort should be made to deliver the head by the simple procedure already described. Should flexion not be well marked, the head may delay and the life of the child be lost through the pressure of the pelvic floor upon the blood-vessels and nerves of the

fetal neck. It is necessary then to act with promptness. The physician should stand squarely in front of the patient, who has been brought to the edge of the bed and placed

FIG. 73.

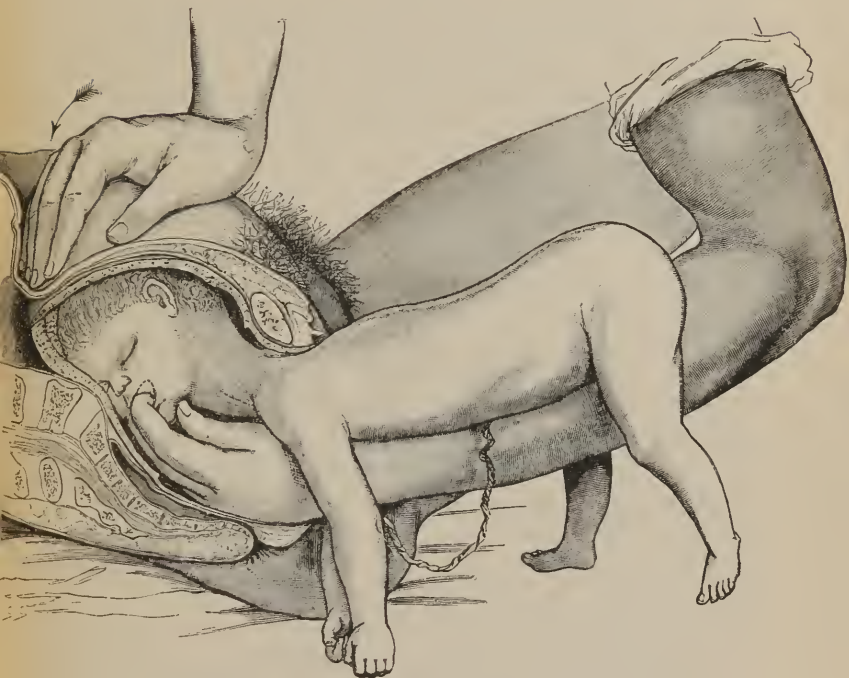


DELIVERING THE ARMS.

across it, her hips projecting over the edge. The left arm should be uncovered to the elbow, thoroughly cleansed, and should be turned with the palmar surface of the hand

upward. The body of the fetus should then be placed astride the forearm of the physician, and the index and middle finger of the left hand should be passed upon the face of the child, making strong pressure upward and forward upon the malar prominences. Raising the body of the

FIG. 74.



THE DELIVERY OF THE AFTER-COMING HEAD.

child upon his left arm, the physician should press strongly downward with his right hand placed behind the pubic joint. Should he not succeed in promptly effecting delivery, he may place the middle finger of the left hand in the child's mouth,

the index and other fingers resting upon the child's shoulders. He may thus make strong flexion, combining it with external pressure, and urging the voluntary efforts of the mother.

If great resistance is to be overcome, the pressure behind the pubic joint may be made by an assistant, while the right hand of the physician is placed upon the child's back, the fingers of the hand grasping the shoulders to aid in traction. When the back of the child is directed posteriorly toward the mother's back, the same method of manual extraction is indicated, delivery occurring with the occiput behind ; the forceps can often be used successfully to better advantage than when the back is anterior (Figs. 71, 72, 73, and 74).

The morbidity and mortality of breech presentations is not increased especially with the mother, but is considerably greater than usual with the child. Asphyxia and exhaustion through pressure upon the after-coming head, the inspiration of matter from the birth-canal, and injury done to the mouth by efforts at delivery, are the principal dangers. Where the arms become tightly wedged beside the head, the humerus or clavicle may be fractured in bringing them down, if force is carelessly exerted upon the shaft of the humerus. It is not uncommon, after the delivery of the child in breech presentation, to have the development of broncho-pneumonia caused by inspiration. The use of antiseptic douches during the early stages of labor diminishes the risk of such pneumonia, and the delivery of the head without the introduction of the finger into the mouth also lessens risk.

The causes of breech presentation are sometimes found in a relaxed condition of the uterus, which allows the fetus to assume various positions during pregnancy. In twin pregnancy it is common to find one of the children presenting by the breech. Labor is longer in breech than in head presentations as a rule, and the case demands patience and careful attention.

CHAPTER XVII.

LABOR IN TRANSVERSE POSITIONS.

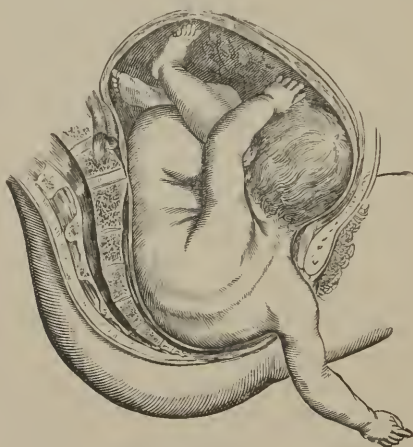
In contracted pelves and in large pelves where the membranes rupture suddenly and the amniotic liquid escapes rapidly, the fetus may become turned transversely across the birth-canal, giving rise to a transverse position. The part which usually presents in these positions is the shoulder. This may best be understood if we suppose a case in which, during the latter months of pregnancy, the fetus occupied the usual position in the uterus, that is, the back toward the mother's left side, the head at the brim of the pelvis, the occiput slightly in front. If now, for any reason, as contraction at the brim of the pelvis, the fetus cannot descend through the brim, or if, by the sudden rush outward of the amniotic liquid the fetus be suddenly moved downward, it may happen that the head will delay in the left iliac fossa, the breech will be near the right iliac fossa, the back of the child toward the abdomen of the mother, the feet in the upper portion of the right side of the mother, while opposite the left ilio-pectineal eminence will be found the posterior surface of the right scapula. As a rule, should labor pains continue, the right arm of the fetus will descend and may even protrude.

When the child is of average size, its descent and expulsion spontaneously may be said to be impossible. It is true that a small fetus or a fetus in an abnormally large pelvis may be so folded upon itself by forcible uterine contractions that expulsion may take place. This occurrence, however, is so rare that the practitioner should never count upon its occur-

rence, but when the transverse position is detected he should at once rectify it and terminate the labor (Fig. 74 A).

The nomenclature of transverse presentations commonly accepted designates the posterior surface of the scapula as the cardinal point upon the fetus. The word *dorso* is used to express the fact that the back of the child presents in these cases. The word *right* or *left* is added to the word *dorso* to designate the shoulder which is presenting. Thus the most frequent transverse position is that in which the right shoulder

FIG. 74 A.

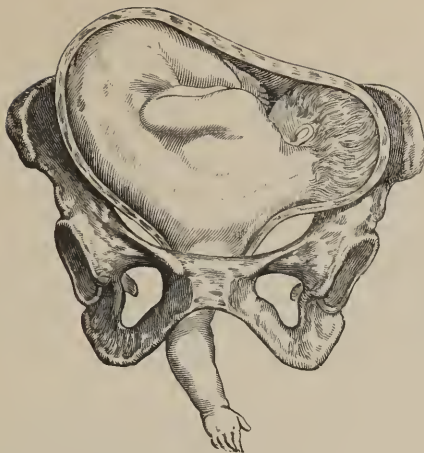


ATTEMPTED SPONTANEOUS EVOLUTION IN TRANSVERSE POSITION.

is at the brim of the pelvis, the back of the child directed in front, as has been already explained. It rarely happens that the back of the child is turned posteriorly (Fig. 75).

The diagnosis of such positions and presentations may be made, first, by palpation, and then by internal examination. On palpating the abdomen, the head can usually be distinguished upon one side above the brim of the pelvis. The breech can generally be recognized upon the opposite side,

FIG. 75.



RIGHT DORSO-ANTERIOR.

FIG. 76.



RIGHT DORSO-POSTERIOR.

and if the transverse position has existed for some time, a hand and arm will have prolapsed, and can readily be found upon examination. It is of practical importance to recognize promptly which shoulder is presenting, and this can be done by determining which hand is prolapsed. If the hand and forearm of the fetus is turned with the radial side or thumb uppermost, and the practitioner grasps the hand as if to shake hands with it, if the fetal hand fits into his right hand, palm to palm, the fetal arm is the right, and the right shoulder is presenting. If, however, the prolapsed hand fits the left hand of the practitioner, it is then the left shoulder which is presenting (Fig. 76).

A further diagnosis may be made by reaching the axilla with the finger, when the ribs of the child are easily distinguished. Passing the finger over the shoulder, the clavicle and the child's neck can sometimes be felt lying in a direction opposite to that in which the ribs were felt.

CHAPTER XVIII.

THE TREATMENT OF TRANSVERSE POSITIONS; VERSION.

In transverse positions, the treatment of such conditions consists in turning the child about so that its long axis shall coincide with the axis of the birth-canal. This may be ac-

FIG. 77.



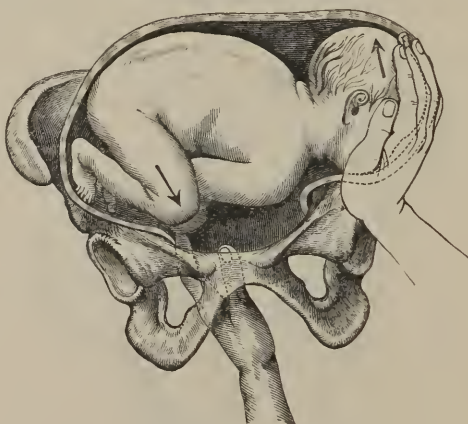
COMBINED VERSION (First Stage).

complished, first, by external manipulation only ; second, by external and internal manipulation combined ; and third, by turning the child within the womb.

To accomplish the first of these procedures, the membranes

should not have ruptured, and the patient should not be in active labor. If she is sensitive and the abdominal muscles irritable, she may be partially anesthetized with ether or chloroform. The practitioner can usually outline the two extremities of the fetus, and by pressing upward upon one of them and downward upon the other by a series of gentle sliding movements, either the head or the breech can usually be brought to the brim of the pelvis. This procedure is known as "External Version."

FIG. 78.



COMBINED VERSION (Second Stage).

By "Combined Version," we understand a method by which one hand of the physician is placed upon the abdomen, while two fingers of the other inserted within the vagina and cervix endeavor to lift up the presenting shoulder, thus dislodging it and favoring the turning. The external hand, by pressing upward upon the breech, favors the descent of the head. This method is often known as that of Braxton-Hicks. It is appropriate for cases in which the membranes have not

ruptured, when the os and cervix are partly dilated, and uterine contractions are not strong. To perform this successfully, anesthesia may be, but oftentimes is not required (Figs. 77, 78, and 79).

“Internal Version,” or turning the child within the womb, is the procedure necessary in cases in which the membranes

FIG. 79.



COMBINED VERSION (Third Stage).

have ruptured, or are ruptured by the operator, and in which there is not sufficient time to perform either of the other manipulations. Internal Version consists in introducing a hand within the uterus, grasping the feet of the child, and bringing them down, thus converting a transverse into a breech presentation. Although a serious procedure, it is one

of the most valuable expedients in the obstetric art, and when skilfully performed, is very safe for mother and child. The patient should always be anesthetized, preferably with chloroform, and placed across a bed, with her hips projecting over the edge. A preliminary antiseptic douche should be given,

FIG. 80.



INTERNAL VERSION (Grasping the Lower Foot).

and, as in all obstetric operations, the bladder and rectum should be empty. Before proceeding to turn, the operator should carefully palpate the abdomen to determine the presence or absence of excessive distention of the lower uterine

segment, indicated by the rigidity of the uterine muscle and the presence of the contraction ring. A clear diagnosis of the position and presentation should be made, and from such diagnosis the situation of the feet of the fetus can be readily determined. The operator will then select for introduction

FIG. 81.

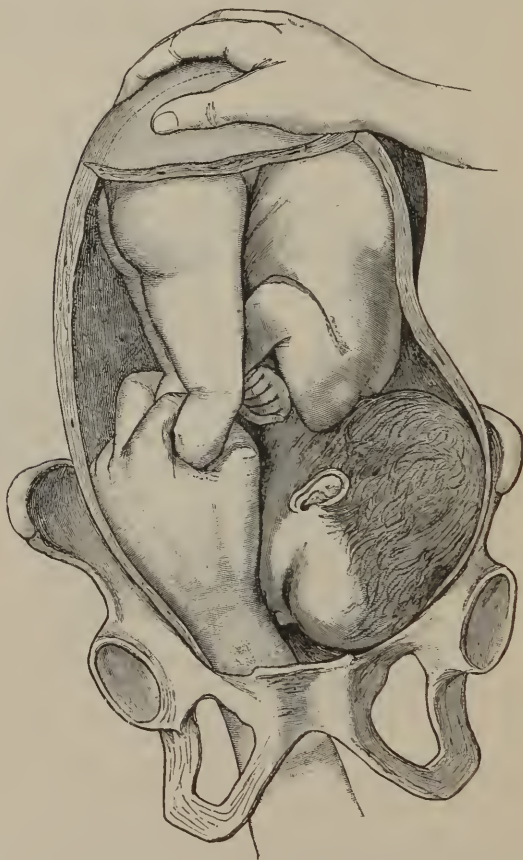


INTERNAL VERSION (Grasping the Upper Foot).

the hand which will pass most readily to grasp the feet (Figs. 80 and 81). Referring to our original example, in a right-dorso anterior position and presentation, the head of the child is in the left iliac-fossa of the mother, the feet and legs of the

fetus lying at the brim of the pelvis and posteriorly upon her right side. As the obstetrician sits before her, his left hand

FIG. 82.

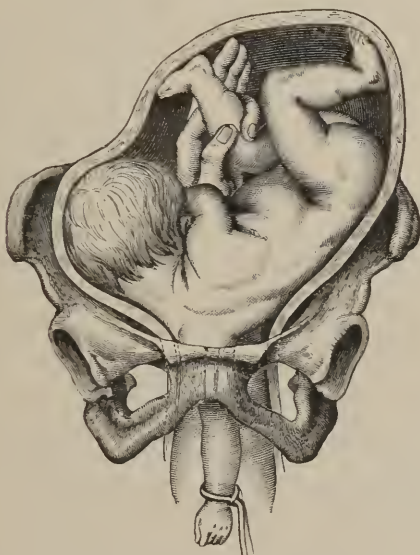


INTERNAL VERSION (Grasping both Feet).

can be introduced most readily to grasp the feet. His arm

should be uncovered to the elbow, rings upon the fingers should be removed, and the nails cut short and carefully cleaned. The hand and arm should then be thoroughly antiseptized ; the back of the hand may be slightly smeared with some antiseptic ointment. To introduce the hand, the patient being anesthetized, the thumb and little finger may be

FIG. 83.



THE NOOSE IN VERSION.

folded toward each other, thus reducing the width of the hand very considerably. The hand should be brought in such relation with the vulva that its greatest diameter of width will be parallel to the greatest diameter of the vulva. The right hand should palpate the abdomen externally, endeavoring to push up the fetal head while the other hand brings

down the breech. The internal hand—the left, in the case which we are considering—should be gently pushed on until the feet of the fetus can be grasped. This simple maneuver of grasping the child's feet should be so done that the finger nails of the operator are turned away from the uterine wall and toward the center of the uterine cavity. To accomplish this, the feet should be seized between the index and middle finger, and the thumb folded over upon them, grasping them firmly in the palm of the folded hand, as shown in the accompanying illustration (Fig. 82). Traction by the internal hand should be slow, gentle, but strong. When the limbs of the fetus have fully descended, the external hand should endeavor to push up the head, thus favoring version.

When the feet have been brought down, if haste is not necessary, it is well to delay the extraction of the child, allowing time for the mother's uterine contractions to expel it. If there be a fear lest the fetal limbs should recede within the uterus, a loop of gauze or bandage should be slipped around a foot or hand. When version is accomplished, the subsequent course of the labor will be simply that of an ordinary breech presentation (Fig. 83).

It will be observed that version by external manipulation can be performed only before the membranes have ruptured, and no considerable degree of dilatation of the os and cervix exists. Version by combined manipulation requires sufficient dilatation to permit at least the introduction of one or two fingers. The membranes may or may not have ruptured. In combined version it is often advantageous to introduce the four fingers through the os, thus grasping the head or breech, and bringing it at once to the desired position. To perform internal version, the membranes must have ruptured, or must be ruptured, and dilatation should be at least almost complete (Fig. 84).

Version is further divided into Cephalic and Podalic, according as the head is brought to the brim of the pelvis, or the feet are brought down, as in internal version. Version

FIG. 84.



THE OBSTETRICIAN ANESTHETIZING THE PATIENT AND PERFORMING
VERSION WITHOUT ASSISTANCE.

as an operation will be further considered in treating of labor in contracted pelves, when we shall find that in flat pelves ver-

sion is indicated when the pelvic contraction is not great and the head fails to engage at the pelvic brim. It has in all cases the advantage of putting the fetus under the control of the operator's hand without the intervention of an instrument. So far as nomenclature of transverse presentations goes, we have, first, and far most common, right-dorso-anterior ; second, and next in frequency, left-dorso-anterior, the dorso-posterior positions being rare.

CHAPTER XIX.

LABOR WHEN THE CHILD AND THE BIRTH CANAL OF THE MOTHER ARE DISPROPORTIONATE IN SIZE.

A considerable number of cases of difficult labor arise from the fact that the child and the birth-canal of the mother are not of proportionate size. In successive pregnancies, it is common to find a slight increase in the size of children born after the first. Again, conditions affecting the mother's nutrition may also influence the growth and size of her child. Thus, children born during a period of famine are naturally smaller than children born amid plenty. The most potent influence in determining the size and type of the fetus is found in the size and type of the father. For example, marriage between a large and finely proportioned man and a small and ill-developed woman may result in children larger proportionately and better developed than the mother, although rarely attaining the stature and perfection of the father's form. On the other hand, a large and finely shaped woman, if married to a man inferior in size and development to herself, may give birth to children far inferior to her own excellences of form and feature. The influence of this law may be illustrated by reference to an actual case ; an ill-developed, badly nourished woman, married to a man as weak and poorly developed as she, gave birth to a small, ill-nourished child after a short and easy labor. The first husband dying, the mother married a large and well-developed man, and became the second time pregnant. The size and proportions of the child were such that labor was so prolonged and difficult that the Cesarean Section was seriously contemplated by the obstetrician in attendance.

Cases of disproportion between the size of the fetus and the birth-canal may be conveniently divided into those in which the size and development of the child exceed comparatively those of the mother, and second, those cases in which the birth-canal of the mother is contracted either by a deformity in the bony pelvis, or by a foreign growth, or previous pathological process in the mother's soft tissues. In cases where the disparity is that of size and development, pelvic measurements will reveal the fact that the pelvis is symmetrical in form, although often below the average in its diameters. Pelvimetry then gives us no information regarding the amount of disproportion in the size of the mother and child, but simply indicates that the mother is either of average size or slightly below. There is no practical method available for measuring the child in the uterus, and any estimate as to the relation between its size and that of the mother's birth-canal must be reached by some method of practical comparison.

In cases in which the head is presenting, an effort should be made to fit the head into the bony pelvis as a head is fitted into a hat. To accomplish this, the patient should lie upon her back, the thighs flexed, and should there be such sensitiveness or irritability of the abdominal muscles as to cause spasmodic contraction upon pressure, an anesthetic should be administered. The obstetrician then endeavors to press the head of the child gently into the pelvis of the mother. For this purpose, a hand should be placed transversely behind the pubes, while with the other, an internal examination is made and the descent of the head is appreciated. If an assistant is available, he should place one hand upon the fundus of the uterus, the other above the pubes, and make pressure gently as already described.

By engagement is understood the fitting of the head into the brim of the pelvis; if it is found that the head enters the pelvis, or engages, its size is such that a favorable termina-

tion of labor may be expected in the usual way. If, however, the head fails to engage, but remains above the entrance to the pelvis, some abnormality exists which should be investigated.

In presentations other than those of the head, we have no practical method of estimating the relative size of the child and the birth-canal. Thus, if the breech presents, a head too large to pass easily through the pelvis may be found at the fundus of the uterus, and yet no accurate idea of its comparative size can be obtained by palpation. Excessive distention of the abdomen, the complaint of the mother of excessive weight, and projection of the fundus of the uterus anteriorly, may point to the presence of one very large child, or of twins. Auscultation may determine that but one fetal heart is beating in the uterus, when a rational inference would be that one child of excessive size was present.

Practical deductions from the effort to estimate the proportionate size of mother and child in symmetrical pelves bear directly upon the question of treatment. If the head can be brought to engage at the brim of the pelvis, and if the mother's muscular tissues, both of the uterus and of the abdominal walls, are sufficiently strong and firm to promise good expulsive efforts, the case should be left to proceed spontaneously, with the expectation that the patient will be able to bring the child through the brim of the pelvis and down upon the pelvic floor, where its delivery can usually be accomplished by the use of forceps, if necessary. When, however, the mother's uterus and abdominal muscles have been distended by previous labors, and their efficiency in contracting thus lessened, the obstetrician will not expect so much to be accomplished in delivery by the patient herself. When dilatation is well advanced, he must be ready, if the head engages but slightly, either to apply the forceps high up at the brim of the pelvis, or to perform version. In cases

where the head is so large that it will not enter the brim of the pelvis at all under pressure from above, no attempt whatever should be made to induce it to enter by the forceps; but a consultation should be held with a view of delivering the patient by version, symphyseotomy, craniotomy, or a Cæsarean section. The dangerous folly of attempting to drag a large head through a small pelvis is too painfully illustrated by actual occurrence in practice to need further demonstration.

CHAPTER XX.

LABOR COMPLICATED BY OBSTRUCTION IN THE BIRTH-CANAL.

LABOR WHEN THE SOFT PARTS OF THE MOTHER PRESENT OBSTACLES TO DELIVERY.—The birth-canal of the mother may be encroached upon by lesions of the soft tissues. The most frequent of these are fibroid tumors, cancer, ovarian tumors and contraction from stenosis resulting either from congenital malformation or from the presence of connective tissue produced by previous inflammation and ulceration. In regard to the presence of fibroid tumors and their influence upon labor, it may be said that labor is not often impossible by reason of this complication. A sub-peritoneal fibroid may become pedunculated by the uterine contractions at labor, and such tumors are sometimes discovered after the patient's recovery when previously their existence had remained unsuspected. Such a tumor may be demonstrated to be freely movable and connected with the uterus by a pedicle. Interstitial fibroids may delay labor by their presence amid the muscular tissues of the uterine wall, and the child may suffer the effects of pressure from such a tumor at its birth. After labor an interstitial fibroid often undergoes partial involution with the uterus. Should septic infection occur, such a tumor will become gangrenous, occasioning a serious complication. Interstitial fibroids are of great importance in cases where Cesarean section is performed. When the incision passes through such a tumor, it will not subsequently unite. Necrosis of the fibroid with septic ab-

sorption has been the result in cases of Cesarean section where these growths have been incised. This furnishes a cogent reason for performing amputation of the uterus (hysterectomy) in such a case, instead of the usual Cesarean section.

Submucous fibroids of the uterus frequently occasion delay in labor, but rarely preclude the possibility of its termination. There generally occurs a movement of accommodation on the part of the presenting portion of the fetus and the tumor, which results in slipping the tumor upward and pressing the fetus downward, so that birth is often possible where at first the outlook seemed most doubtful. The practitioner will do well not to have recourse to a dangerous obstetric operation upon the mother when he first discovers the existence of such a tumor during labor. Should, however, the fibroid become prolapsed, it is sometimes possible to sever its pedicle and deliver it before the birth of the child. Should such a tumor remain after the birth of the child, it is well, if possible, to remove it. Inversion of the uterus has sometimes resulted from traction made by the pedicle of a submucous fibroid during labor.

In cases of pregnancy complicated by cancer of the cervix, special precaution should be taken to keep the birth-canal, so far as possible, antisepticized. Douches of creolin or carbolic acid or permanganate of potassium, followed by the free use of iodoform in combination with bismuth or boric acid, may be employed to advantage for this end. If the cancer be discovered early when only the cervix uteri is involved, pregnancy is no contra-indication to the immediate removal of the growth. When, however, the cancer has penetrated above the cervix, the obstetrician should be prepared to further the continuance of the pregnancy, being ready to remove the child by Cesarean section when viability is well assured. The outlook for the mother after such Ce-

sarean section is very grave from the danger of septic infection in the uterine incision from the cancer. By the free use of antiseptics and tamponing the vagina with iodoform gauze during the operation, it is possible to deliver a living child without materially shortening the life of the mother or increasing her suffering. When the cachexia caused by cancer is borne in mind, it will be seen that the free use of mercurial douches in these cases is unadvisable because of the added danger of mercurial intoxication. It is quite possible for labor to occur in a patient having cancer of the cervix and for the labor to terminate spontaneously. If dilatation is delayed by the infiltration of the cervical tissues with the growth, it is admissible to incise the cervix to a moderate extent, thus facilitating delivery. By the strictest antiseptic precautions it is possible in these cases to preserve the life of the child.

Fibro-cystic tumor of the ovary or an ovarian cyst may complicate pregnancy and labor. It frequently happens that the pressure of the enlarged uterus upon such a tumor causes necrosis of its tissues, and may give rise to septicemia. There can be no question of the duty of the obstetrician in such cases to at once remove the tumor. Pregnancy will generally go on to its normal limit, and should ovariectomy be necessary at the beginning of labor, it should not seriously endanger the mother's interests. Fibro-sarcomata of the pelvic tissues form a most serious complication of pregnancy and labor. If the patient is seen early in labor, amputation of the uterus is indicated. If the child is dead, however, embryotomy and its immediate removal are the duty of the obstetrician.

In cases of stenosis of the birth-canal arising from congenital malformation, careful examination of the patient should be made with a view to determine the possibility of incising and dilating. The possibilities of nature are so great that cases seemingly hopeless have been delivered through the natural channel. This is especially true in cases where the stenosis

is the result of congenital malformation, and where the elasticity of the tissues has not been impaired by infiltration with pathological products. When it is decided, however, that birth cannot proceed normally, the Cesarean section should be performed so soon as labor pains begin. It should be remembered that the obstetrician is rarely justified in amputating the uterus, thus destroying a patient's power of reproduction. There are on record a sufficient number of cases of repeated Cesarean operation to justify simple uterine incision in these cases, and to discourage resort to amputation of the uterus. In cases where the tissues are infiltrated by pathological products, multiple incisions under antiseptic precautions have sometimes made it possible to deliver a viable child through the natural passage. The most unfavorable of these cases are those of advanced syphilis, where the mother's danger of septic infection is very great. Here also the knowledge that the fetus is probably infected should lead the practitioner to regard the interest of the mother more, and those of the fetus less, in deciding upon his treatment of the case.

CHAPTER XXI.

LABOR IN DEFORMED PELVES.

LABOR IN SYMMETRICALLY LARGE PELVES.—In women of large stature, and often without apparent cause in general development, the pelvis is found symmetrical, normally shaped, but larger than usually the case. These are called Symmetrically Enlarged (Justo-Major) Pelves. When the fetus is of average size, labor in such pelves is rapid and easy. Occasionally the child turns across the pelvis, or the cord slips down and prolapses, when version is required.

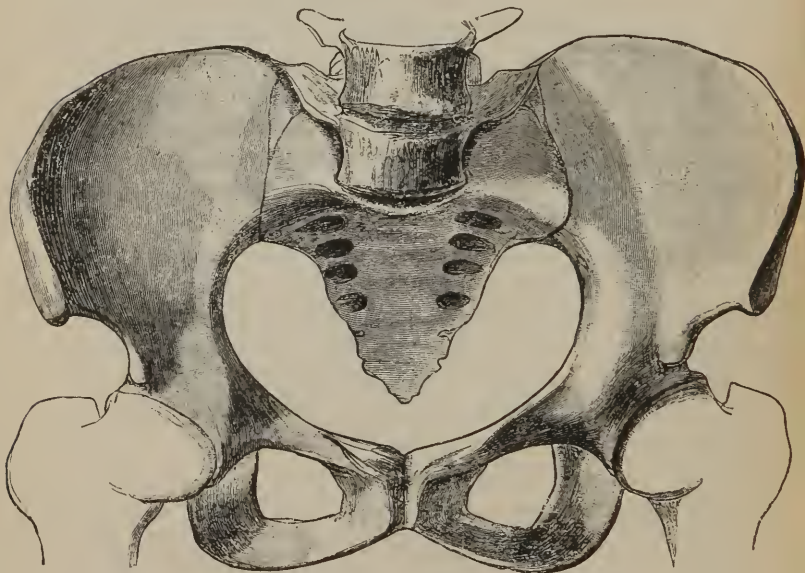
LABOR IN SYMMETRICALLY SMALL PELVES.—Such pelves are symmetrical, normally shaped, but below the average in dimensions. They are named Symmetrically Small (Justo-Minor) Pelves. Labor and its treatment in these pelves have been considered under the heading “Labor, when the Child and Birth-canal of the Mother are Disproportionate in Size.” (Fig. 85.)

The bony tissues of the mother's birth-canal may be deformed and contracted from several causes. Rhachitis, osteomalacia, fractures, and abnormalities caused by abnormal forces acting upon the skeleton during the period of development are the most frequent causes of bony deformities.

It will be interesting to note some of the factors which give to the pelvis its usual contour and proportions. The most apparent force tending to push the sacrum downward and forward is the weight of the head and trunk transmitted through the spinal column. Acting at nearly right angles to these is the force exercised in walking and standing by pressure by

the heads of the femora in the acetabular cavities. These two forces are modified by the elasticity of the pelvic bones, and by the strength of the ligaments at the pubic joint, the ischio-sacral and coccygeal ligaments, and by the inherent tendency through long evolution possessed by the bony tissues of the female organism to develop after its type. The result

FIG. 85.



SYMMETRICALLY SMALL (JUSTO-MINOR) PELVIS.

of all these interacting forces is a pelvis of average proportions (Figs. 86 and 87). When, however, any one of these factors in development is deficient, there results a lack of symmetry or deformity in the pelvis. The most simple of these conditions is contraction in the antero-posterior diameter only, giving rise to the simple, flat pelvis. This occurs

in women who have been prevented by any reason from exercising the lower limbs during childhood, as in cases of infantile paralysis, where the lower extremities have been partially

FIG. 86.



FIG. 87.

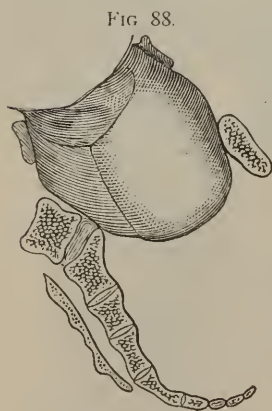


THE POSTURE AND ABDOMINAL PROTRUSION
IN A WELL-FORMED PREGNANT
WOMAN.

POSTERIOR SURFACE OF A
WELL-FORMED FEMALE
BODY.

or wholly paralyzed, and life is still persistent. Such children remain principally in the sitting posture, thus transmitting

weight downward upon the sacrum, while the counteracting forces of pressure by the femora are lacking. In many cases no cause whatever can be ascertained for the occurrence of this deformity. There is usually no sign of its presence in the stature or development of the patient, and hence the great liability of the obstetrician to overlook such a deformity unless it is his custom to universally measure the pelvis of his patient. When labor occurs in a simple, flat pelvis, the head will naturally turn in such a position as to bring one of its lesser diameters in relation with the smallest diameter of the pelvis. This results in a transverse position of the head at the brim, the bi-temporal or bi-parietal diameter being brought in relation with the antero-posterior diameter of the pelvic



HEAD ENTERING A FLAT PELVIS.

brim (Fig. 88). If the contraction be not excessive, and the patient's expulsive forces be good, the head will descend transversely through the brim of the pelvis. The center of the pelvic cavity and the pelvic floor being reached, there will be found no obstacle to rotation, and labor may proceed normally. When, however, the narrowing at the brim of the pelvis is considerable, the head will not descend, but will remain transversely at the brim. The pressure of the uterus continuing, one of the parietal bones will gradually descend lower than the other, and thus what is known as a parietal presentation will result.

So far as the question of detection is concerned in such pelvises, a diagnosis will be readily made by any one who practices pelvimetry as a rule. The narrowing of the antero-



Fig. 1.

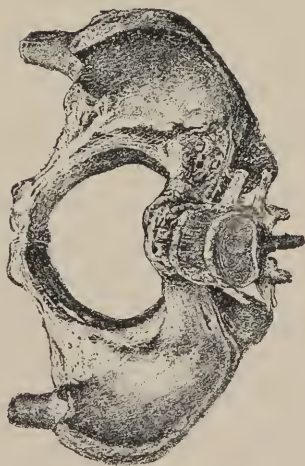


Fig. 2.



Fig. 3.

FIG. 1.—Inlet of normal pelvis.

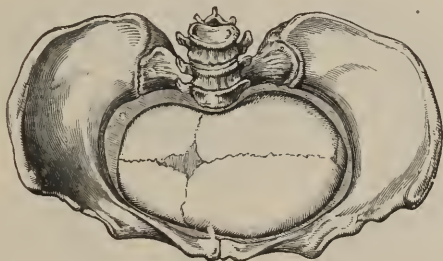
FIG. 2.—Inlet of symmetrically contracted pelvis.

FIG. 3.—Inlet of obliquely contracted pelvis,
(Lumbo-sacral kypho-scoliosis.)

DEFORMED Pelves. (*Martin.*)

posterior diameter, while the other diameters of the pelvis remain unaltered, renders the diagnosis comparatively simple. If the obstetrician has the patient under his charge during the second half of her pregnancy, he may select a favorable opportunity for the induction of labor. It has been found that the greatest transverse diameter of the fetal head increases most from the thirtieth to the thirty-sixth week. Accordingly, when the antero-posterior diameter measures eight centimeters, or three and one-eighth inches and over, we may delay until the thirty-fifth week for the induction of labor. When it measures seven and a half to eight centimeters, or

FIG. 89.



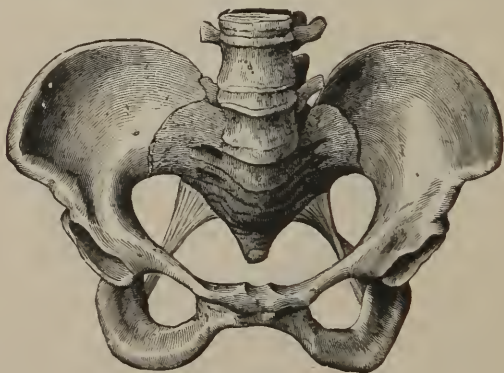
FLAT PELVIS, THE HEAD PASSING THROUGH AFTER VERSION.

two and nine-tenths to three and one-eighth inches, the thirty-first to the thirty-fourth week may be chosen, and when this diameter is smaller than two and nine-tenths inches, it is not well to delay beyond the thirtieth week. The obstetrician will hope that by the induction of labor the head may be enabled to descend through the brim of the pelvis, and the labor terminate spontaneously. When, however, he is called to a case at the end of gestation, in which he finds a simple, flat pelvis, he will do well to delay only until dilatation is complete, and opportunity has been afforded the head to descend by the natural forces of expulsion through the brim

of the pelvis. Should such descent not occur promptly, podalic version should be performed, and the child delivered in that manner. Symphyseotomy may also be required. The use of the forceps in simple, flat pelvises is rarely to be chosen, as the instrument grasps the head at a disadvantage, and injury to the mother and child is likely to result (Fig. 89).

A rhachitic pelvis presents not only contraction in the antero-posterior diameter of the brim, but also a diminution in the transverse diameters of the pelvis. It will be remem-

FIG. 90.



FLAT RHACHITIC PELVIS.

bered that in the normal pelvis the distance between the anterior-superior spines is always less than the distance between the outermost points of the crests. In the rhachitic pelvis this relation is either lost or reversed. The upper edges of the ilia, instead of curving downward from the anterior-superior spine, extend directly backward, or even curve slightly inward. Upon pelvimetry, the obstetrician will find the antero-posterior diameter of the pelvis shortened, the transverse diameters contracted as indicated, and not

Fig. 1.



Fig. 2.

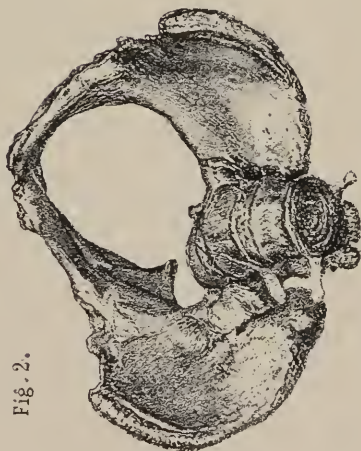


FIG. 1.—Inlet of flat, rachitic pelvis.

FIG. 2.—Inlet of obliquely contracted, anchylosed pelvis.

DEFORMED PELVES.

(Martin.)

Fig. 3.

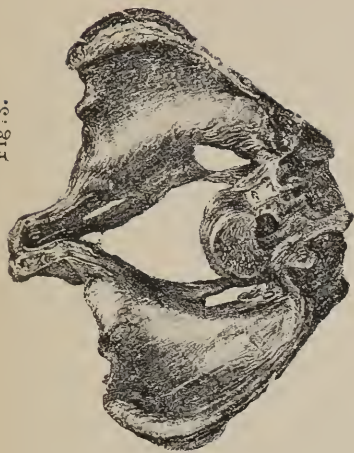


Fig. 4.



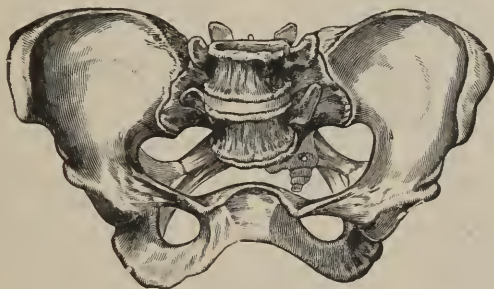
FIG. 3.—Inlet of osteomalacic pelvis.

FIG. 4.—Inlet of pelvis contracted by exostoses.

infrequently some variation on closer examination in the oblique measurements of the pelvis (Figs. 90 and 91). In addition to these diagnostic points, close inspection of the patient's skeleton will reveal crooked limbs, enlargement of the epiphyses at the extremities of the long bones, enlargement of the costal cartilages, producing the beaded appearance of the ribs and sternum, with the characteristic deformity of the cranium and face.

Labor in such pelves will be difficult in proportion as the child is large and the pelvis greatly deformed. Here again the same indications for the induction of labor obtain which

FIG. 91.



FLAT RHACHITIC PELVIS.

have just been stated in the simple, flat pelvis. As a rule, the head will enter in strong flexion, and should the child be small and the mother strong, the head may be forced down through the brim of the pelvis upon the pelvic floor. Labor may then be terminated by the careful use of the forceps. Should the head engage, the forceps may be applied at the brim of the pelvis, and axis-traction performed to deliver the child. If the head does not engage, but after labor-pains have become well established it continues to remain at the brim of the pelvis, or passes to one side into one of the iliac fossæ,

the question of symphyseotomy, craniotomy, or the Cesarean operation must be raised (Fig. 92). In flat, rhachitic pelvis, no advantage will be obtained by performing podalic version,

FIG. 92.

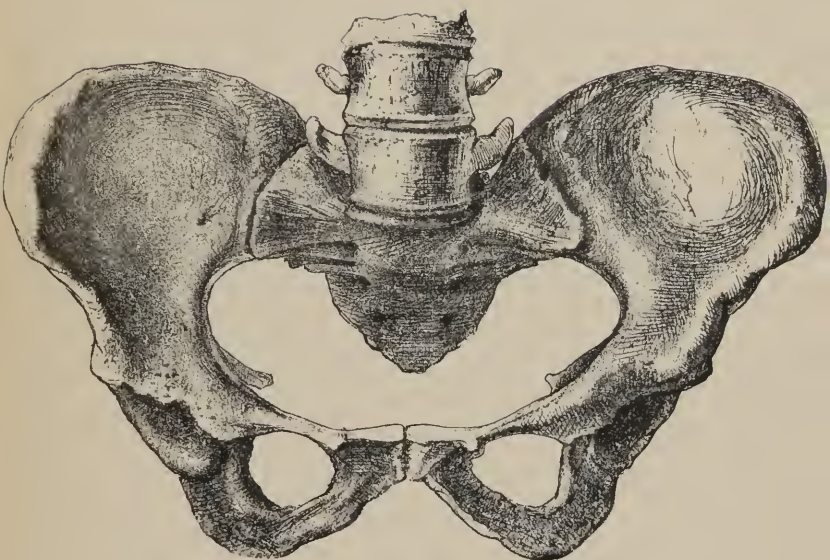


ATTITUDE AND ABDOMINAL PROTRUSION (PENDULOUS ABDOMEN) OF A WOMAN WITH RHACHITIC PELVIS.

as extension of the head would probably result in impaction and subsequent death of the fetus.

Rhachitis may be found in combination with other deformities of the pelvis, resulting in irregularly-shaped pelvis, giving rise to various abnormalities in the course of labor. Thus, projection backward of the spinal column called kyphosis may be present, causing an enlargement of some diameters of the pelvis, with a contraction of others. Again, hip-joint disease in a rhachitic person would result in an oblique deformity of the pelvis, and hence a diminution in the oblique diameters. These mixed deformities of the pelvis can best be appreciated by internal palpation. The obstetrician, finding that the measurements obtained

by external pelvimetry are abnormal, will then have recourse to an internal examination of the pelvis. Two or



FLAT RHACHITIC PELVIS. (*Martin.*)

three fingers should be introduced, and the sides of the pelvis thoroughly examined. Thus a contraction at the brim can be estimated, and projection inward at the side of the pelvis will be detected, and by placing a finger upon each tuberosity of the ischium some idea may be gained as to the dimensions of the pelvic outlet. While elaborate instruments have been devised for such examination, none has been found so efficient as the hand of an intelligent observer. In esti-

FIG. 93.



SPONDYLOLISTHETIC PELVIS.

imating the existence of a deformity at the pelvic outlet during labor, the practitioner will find it of value to examine the lateral diameter of the pelvis at a line drawn from one spine of the ischia to the other. Should he find that the head with its greatest circumference has passed a line drawn between the spines of the ischia, he may conclude that no contraction sufficient to prevent the spontaneous termination of labor exists at the pelvic outlet.

Spinal deformities are not infrequently associated with rhachitis, and may delay the descent of the fetus into the pelvic cavity. A projection forward of the spinal column known as lordosis, lateral curvature of the spine known as scoliosis, kyphosis, already mentioned, and a peculiar deformity caused by a partial dislocation of the body of one vertebra upon that below, with a lateral twist of the vertebræ, called spondylolisthesis, may prevent descent of the body of the fetus or cause an abnormality in its presentation or in the

FIG. 94.



OBLIQUELY CONTRACTED PELVIS FOLLOWING FRACTURE.

mechanism of labor (Fig. 93). Such spinal deformities, when detected during pregnancy, are additional indications of the probable existence of pelvic deformity, and should not escape the attention of the obstetrician.

While the simple, flat pelvis and the rachitic pelvis are most common, there exists comparatively rare forms of pelvic deformity known as the obliquely contracted pelvis of Naegele, the funnel-shaped pelvis, the infantile pelvis, and the osteomalacic pelvis.

The obliquely contracted pelvis can be examined by measuring between the posterior superior spines and the anterior superior of opposite sides (Fig. 94).

The funnel-shaped pelvis retains somewhat the type of the male pelvis and, as its name implies, is longer and narrower than the normal.

In the infantile pelvis, the widening and expansion characteristic of the normal female pelvis have not occurred, and the pelvis remains practically that of a young child.

In the osteomalacic pelvis, softening of the bones has resulted in the bending inward of the anterior half of the pelvis, bringing the two rami of the pubes almost in apposition in the form of an irregular beak or projection. Other indentations of the pelvis may result from osteomalacia, giving rise to various deformities. It may be noted that the disease may occur during pregnancy. It is characterized by severe rheumatic-like pains in the pelvic bones, by great prostration, and by softening which becomes evident upon careful examination. So severe may be these symptoms that the interruption of pregnancy may be necessary to preserve the life of the mother. When recovery takes place from osteomalacia, a process of thinning of the bones occurs known as osteoporosis. The pelvis becomes thinner, lighter in weight, more fragile in consistence. On the other hand, when rhachitis advances but slightly, and recovery occurs during early life, a process of hardening and deposition of bony material takes place which is styled osteo-sclerosis.

In summarizing the indications for treatment in deformed pelvises, it may be repeated that the induction of labor should be kept in mind in cases coming under the care of the obstetrician before term. As pregnancy progresses, the simple maneuver already described of pressing the head into the pelvis may be employed at intervals of ten days or two weeks to give some idea as to the time when the induction of labor

is necessary. When the head will not engage under gentle pressure, pregnancy should be interrupted. In simple, flat pelves, the obstetrician must be prepared to terminate labor by version, followed if needed by symphyseotomy. In flat, rhachitic pelves, a cautious use of the forceps after symphyseotomy, with craniotomy and Cesarean section to be kept in reserve, is indicated.

CHAPTER XXII.

PREMATURE LABOR.

ABORTION : MISCARRIAGE.—In a considerable proportion of cases pregnancy is terminated before its usual duration has expired, through some disease or accident. It has been customary to designate the termination of pregnancy before the formation of the placenta at the fourth month as abortion ; between the fourth month and the period of viability at the seventh month as miscarriage ; and between the seventh month and ninth month as premature labor ; these distinctions, however, are without practical differences, and the simpler way is to consider the interruption of pregnancy before the period of viability as abortion, and between the period of viability and the usual termination of pregnancy as premature labor. The word miscarriage is less objectionable to the minds of patients, who commonly associate with the term abortion a possible criminal element.

The causes of the premature termination of pregnancy are those which affect the mother, or the ovum, or both ; most common of all is syphilis. In regard to the conveyance of the syphilitic poison, it is possible for a syphilitic father to beget syphilitic children without infecting necessarily the mother ; it is probably impossible for a syphilitic woman to bear a child not tainted by syphilis ; when father and mother are both syphilitic the offspring present unmistakable evidences of syphilis. Diseases which affect the general health of the mother also interrupt pregnancy ; acute infections causing high temperature commonly interrupt pregnancy

when the temperature remains above 104° F. for a considerable time. Chronic infections, such as, in addition to syphilis, malaria, lead poisoning, and alcoholism, cause abortion.

Diseases affecting the fetus and its envelopes also terminate its existence; such are dropsy of the chorion, adhesion between the layers of the amnion, and the abnormal secretion of amnial liquid. Violence may affect the mother and ovum by separating the latter from the wall of the uterus by rupturing the membranes, or by its influence upon the nervous system producing uterine contractions; the effect of mechanical violence depends, however, largely upon the condition of the mother's tissues; where the woman has never had endometritis and her tissues are in a healthy condition, she may sustain a very considerable degree of direct mechanical violence without the occurrence of abortion; persistent disturbance is often more dangerous than a considerable shock; thus the jar of a railway train will sometimes produce disaster, when a fall of several feet will not. That which tends to increase irritability of the nervous system also results in the interruption of pregnancy, and when once this condition of exaggerated reflexes exists the slightest cause may produce an interruption of pregnancy.

The symptoms of a threatened termination of pregnancy are abdominal pain and hemorrhage; the pain is caused by the contraction of the uterus, and hence is to be distinguished from intestinal colic, neuralgia of the solar plexus, acute dyspepsia, or the suffering caused by a distended bladder; the hemorrhage is bright in color, and varying in quantity; should the process go on, further symptoms are an increase in the hemorrhage, with the discharge of portions of the ovum or the ovum entire. The interruption of pregnancy is most common between the third and fourth month, and at any period of pregnancy when menstruation should have occurred if conception had not taken place.

The treatment of abortion and premature labor consists, first, in prophylaxis ; if syphilis exists the patient should be treated by the administration of the biniodid or bichlorid of mercury, together with cod-liver oil, hypophosphites, iron, and arsenic ; it is to be remembered that the treatment of syphilis demands not only the use of alteratives, but also the employment of those agents which will most effectively favor the reproduction of the blood. During acute diseases but little can be done to prevent the interruption of pregnancy beyond that which is indicated in the mother's interest only ; it is well to control, if possible, the patient's fever and lessen the irritability of her nervous system ; conditions of chronic infection are to be remedied by appropriate treatment which is most advantageously employed when the patient is not pregnant.

By the habit of abortion is understood the recurrence of this accident ; when the cause is found and removed the habit is broken. In cases which present no easily found cause for abortion it is well first to see that the patient is not suffering from chronic endometritis ; should such be the case, dilatation of the uterus followed by the application of antiseptic and alterative substances to the endometrium, and often the removal of the diseased tissue by the curette, may be followed by conception. When no cause other than excessive irritability be found, it is sometimes necessary to place the patient entirely at rest until her pregnancy be several months advanced ; actual confinement to her bed is the only successful treatment for such a condition ; her health in the meantime should be maintained by massage and attention to her nutrition. When abortion has actually begun absolute rest is imperative ; usually opium will be found the best drug to allay the activity of the nervous system ; the patient should abstain from all kinds of stimulants, should remain lightly clad, and avoid heating and stimulating food.

Should the physician fail in his efforts to check the premature expulsion of the ovum, his treatment should be addressed to securing its expulsion entire (Fig. 95); in cases occurring prior to the fourth month this can best be done by controlling the hemorrhage with an antiseptic tampon and stimulating uterine contractions; as material for the tampon, iodoform gauze, bichlorid of mercury gauze, or masses of

FIG. 95.



Clot and rup-
tured vessels.

OVUM OF TWO MONTHS, INTACT.

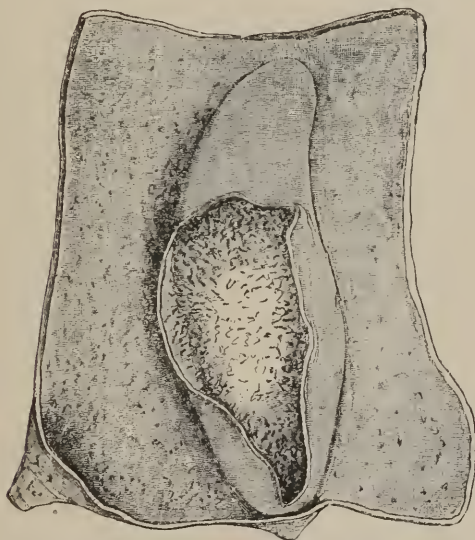
cotton impregnated with an antiseptic may be employed.

Where the odor of iodoform is not objectionable, iodoform gauze should be chosen; in the absence of gauze, cheese cloth, soaked in a solution of bichlorid of mercury, one to five thousand, will answer; failing to obtain cheese cloth, an ordinary roller bandage or a strip of old sheeting will serve every purpose; if the assistance of a nurse is available it is well to have the patient given a hot antiseptic vaginal douche; following this she is placed across a bed at the edge; introducing one or two fingers of one hand as a guide, the physician

takes the end of the strip of tampon, and, with a pair of dressing forceps, passes it up, and with the finger packs it thoroughly into the os and cervix and around these parts; the vagina may also be moderately distended with the same material; the administration of ergot in medium doses,

fifteen to thirty drops of the fluid extract every two or three hours, combined with the administration of quinin in debilitated patients, is also indicated. Under such treatment it is usual, after from six to twelve hours, for the physician to find the ovum in the upper portion of the vagina upon removing the tampon; he may find it just within the os, whence he should remove it cautiously with the finger; after its expul-

FIG. 96.



SAME OVUM, DECIDUOUS MEMBRANES OPENED, SHOWING
VILLI OF CHORION.

sion a hot vaginal douche should be given, and if the fingers or any instrument have entered the uterus, an intra-uterine douche should be administered.

Should the ovum rupture and a portion be retained, the uterus should be explored as soon as possible by the antisept-

ticized finger of the obstetrician and its contents removed ; if sufficient dilatation is not present to permit of this manipulation, Barnes' dilators, or a solid uterine dilator, such as Simons', may be employed ; and if the cervix is found resisting, a tupelo, or slippery-elm tent, should be used (Fig. 96). Next to the finger as an instrument for emptying the uterus after abortion, stands the intra-uterine curette ; of these our preference, from experience, is for that of Carl Braun, which has a long, hollow handle terminating in a blade whose edge is as sharp as that of a paper-knife ; this handle is connected with a fountain syringe, and thus a constant stream of antiseptic fluid irrigates the uterine wall while the curette removes retained material ; after the uterus has been emptied and cleansed, it is well to leave within its cavity sixty grains of iodoform, aristol, or boracic acid in the form of a suppository. In view of the fact that portions of the ovum are often retained and spontaneously expelled without serious consequences to the patient, such thorough precautions may seem meddlesome and injudicious, but the number of cases of septicemia which follow abortion is sufficiently great to warrant the obstetrician who desires to do his duty in not leaving his patient until he is satisfied that her genital tract is empty and has been thoroughly antiseptized.

The treatment of abortion after the fifth month resembles that of normal labor, except that delay may occur in the dilatation of the os and cervix, and difficulty may be experienced in aiding the expulsion of the fetus ; as the uterus is not fully prepared for labor, deficient expulsive pains are not uncommon. Although the fetus may present by the head, it will be better in such cases to perform version and extraction by the feet, as the forceps is not always successful in grasping securely the head of a premature fetus. It is in cases of this sort that adherent placenta is most often encountered, although in the minds of patients and their friends the pla-

centa is thought to be adherent when it is not promptly expelled. The obstetrician will recall the fact that adherent placenta is not a frequent complication in obstetric practice, while temporary retention of the placenta occurs quite frequently. In cases where the placenta is attached to the uterine wall so firmly that uterine contractions do not separate it, a cautious attempt should be made by the obstetrician to separate and remove it with his hand; the greatest care should be exercised not to wound the uterine tissue any more than can possibly be avoided, and, rather than do violence, it is better to allow the placenta to remain, after antiseptizing the uterus, and keep the patient under observation until the placenta shall have become loosened, when it can be safely extracted. During this time, until the placenta can be removed, four vaginal douches of bichlorid of mercury, one to five thousand, should be given in twenty-four hours; the uterus should be irrigated twice in twenty-four hours with carboic acid, creolin, thymol, or boracic acid, as has been elsewhere described; the local disinfection of the uterus should be maintained by iodoform, aristol, or boracic acid, by uterine suppositories, and an antiseptic tampon can often be kept within the uterus to advantage. Under such precautions it is safe to wait for the loosening and expulsion of the placenta without radical interference; but under less careful precautions it is hazardous to do so; the curette is of advantage in such cases after the placenta has become loosened, and small fragments still remain which do not admit of easy removal by the finger.

Abortion is also divided into therapeutic and criminal; by therapeutic abortion is understood the intentional interruption of pregnancy by the obstetrician in the interests of the mother; pernicious vomiting, toxemia, threatening eclampsia, and some obstruction in the mother's birth-canal are the most frequent indications; the method best chosen in these

cases consists in the dilatation of the uterus by tents, by solid dilators, or the Barnes bag, with the removal of the ovum, as has just been described. In cases where pregnancy is further advanced, a bougie may be introduced into the uterus between the membranes and the wall of the uterus, and allowed to remain until expelled by uterine contraction. In very early pregnancy the introduction of a sound into the uterus may rupture the ovum, when it may be absorbed without danger to the patient. Her safety, however, in all these procedures depends very largely upon the careful antisepsis practised by the physician, and in general it may be stated that that method of producing abortion is best which is most sure to do little violence to the mother's uterus and leave it entirely empty.

By criminal abortion is understood the interruption of pregnancy without justification ; this is commonly practised by the administration of drugs supposed to produce uterine contractions ; such are tansy, nutmeg, ginger, cantharides, and a number of patent medicines whose active principle is usually ergot or quinin. It is extremely doubtful in healthy women whether any of these drugs are capable of producing the desired effect ; they are certainly far from being reliable ; failing to produce abortion with these means, the patient usually seeks the assistance of an accomplice ; the injection of hot or cold water into the vagina, and the introduction into the uterus of a foreign body, are the most usual methods employed ; splinters of wood, hair-pins, pieces of whale-bone, pieces of wire, and various articles have been used for this purpose.

Those who practise abortion are usually ignorant of antiseptic precautions, and hence septic infection following criminal abortion, with death from septicemia and peritonitis, are not uncommon ; electricity has been tried to produce abortion, occasionally with success, often with failure.

Diagnostic signs of criminal abortion, either attempted or successful, are signs of early pregnancy with some evidence that injury has been done to the genital tract ; when such evidence is presented, the physician called to care for such a patient should remember the danger of septic infection and endeavor to counteract it, while co-operating with the authorities to bring the offender to justice.

CHAPTER XXIII.

INDUCED LABOR.

Whenever the interests of mother or child demand the termination of labor after the child is viable, but without waiting for the forces of Nature to produce spontaneous labor, the artificial ending of gestation is known as induced labor. The indications for this procedure are diseases seriously threatening the life of the mother, a contracted condition of the birth-canal, making it dangerous for delivery to take place when the child is at term, and any condition of the fetus rendering its death probable if it be allowed to remain in the uterus.

Among the maternal indications for induced labor are such diseases of the mother as result in pathological changes in the endometrium and placenta, rendering the life of the child impossible after a certain period of pregnancy. This may be well illustrated by chronic nephritis occurring during pregnancy. Whenever the obstetrician detects habitually in the urine of the pregnant woman various forms of tube-casts, with or without albumin, and this condition persists, he will know that the existence of the fetus is jeopardized, and that labor should be induced when viability is assured. A distinction should be made between acute and chronic disease processes in the mother as regards the interruption of pregnancy. In acute infectious diseases, the course of the disease is usually influenced unfavorably by any effort to terminate the pregnancy, while in many chronic conditions the induction of labor greatly relieves the patient. The death of the fetus furnishes an indication for the induction of labor, and also

any history of complications occurring during previous pregnancies, or at previous labors, threatening the lives of mother and child.

In so far as contraction of the birth-canal is an indication for the induction of labor, this will evidently depend upon a comparison instituted between the size of the child and that of the birth-canal, as has been already described. In the section upon labor in contracted pelves, this point has been discussed, and also the precise periods of pregnancy at which interruption was justified. In general, it may be stated that when upon examination of a pregnant woman the antero-posterior diameter at the brim of the pelvis is found to measure but eight centimeters, or three and one-eighth inches, the question of the induction of labor should be seriously considered.

The methods of inducing labor consist in efforts by various means to cause uterine contraction. These efforts have been made by directly irritating the uterus, as with an electric current, with dilators, or a bougie ; also by the giving of some drug acting upon the uterine muscle and causing contraction, or by disturbing the relations of the fetus and the uterus by evacuating the amniotic liquid, thus allowing the child itself to make pressure against the wall of the uterus and excite contraction.

To specify more clearly, the induction of labor has been attempted by the use of a strong faradic current, one pole being placed above the pubes, the other upon the lumbar spine. Efforts have been made to secure uterine contractions by rubbing or kneading the uterus, and also by hot douches. Barnes' dilators and tents of various sorts have also been introduced to dilate the cervix and promote uterine contractions. Water and also glycerin have been injected into the uterus between the membranes and the wall of the womb, to cause uterine contractions. Drugs whose properties are to irritate

and excite the uterine muscle have also been given, such as ergot, tansy, quinin, strychnin, and some of the volatile oils. The membranes have also been ruptured, a portion of the amniotic liquid allowed to escape, and the head brought directly against the os and cervix, thus exciting uterine contractions ; but the best and safest of all methods consists in introducing within the uterus, between the membranes and the wall of the womb, a flexible rod or bougie. This acts as a foreign body whose irritation rarely fails to bring on labor. Second in efficiency and value to this is the use of Barnes' dilators. In introducing a bougie, one should be selected which is solid, and which has never been used before. A medium size should be chosen, and care should be taken that the bougie has not been corroded or roughened in any manner. It should be immersed for some time in a solution of bichlorid of mercury one to five hundred, after which it may be kept in a mercurial solution one to two thousand, or in a carbolic solution five per cent., until it is used. If convenient, a vaginal douche should be given before the introduction of the bougie. The greatest care should be exercised by the obstetrician in cleansing his hands and in avoiding contact between the bougie and the bedding of the patient while introducing it. Two fingers of one hand are then inserted to the cervix, and the bougie passed along these fingers as a guide through the os. No force should be used in introduction ; but it should be allowed to go where it will pass most easily, care being taken to avoid rupturing the membranes. The bougie should be inserted until but an inch of its length remains outside the cervix. If it shows a tendency to slip out easily, a moderate tampon of iodoform gauze should be inserted to retain it in position. In cases where the head is low in the uterus, it may be necessary to raise it by pressure in the vagina or by supra-pubic pressure, before a bougie can be inserted.

An antiseptic occlusion dressing should be worn over the vulva during the induction of labor.

A bougie may be conveniently inserted during the afternoon or evening. Intermittent uterine contractions causing dilatation will usually continue during the night. In the morning, it will be found upon examination that softening and dilatation of the os and cervix have resulted. The bougie should then be removed, an antiseptic douche be given, and the first bougie with a second in addition should be introduced. The number may be increased until several are employed at once. The length of time required to bring on active uterine contractions by this method varies greatly. Forty-eight hours will usually suffice to cause active labor, but in a case in the experience of the writer, bougies remained in the uterus between five and six days before labor came on. If antiseptic precautions be faithfully observed, and the membranes be not ruptured, no harm will come to the patient from a prolonged use of this method.

The employment of a Barnes' dilator to induce labor is indicated in cases where the os and cervix are already sufficiently large to admit of its introduction, and where it is desired to dilate the uterus and terminate labor as speedily as possible. The obstetrician should provide himself with several sizes of dilators whose capacity he ascertains before using them. A dilator should be slightly oiled, and introduced well into the cervix. An antiseptic solution is then forced into the dilator until considerable distention and the firm application of the dilator to the sides of the cervix have been secured. If the capacity of each Barnes' bag is known by the obstetrician, little danger will exist of rupturing the dilator and forcing fluid into the uterine cavity. The use of an antiseptic fluid reduces the risk from this accident to a minimum.

It will usually be found in between one and two hours that the dilator has accomplished its mission, and that a second

and larger is required. In from four to eight hours the uterus may be so dilated by this method that the application of forceps, or performance of version, will be possible.

When induced labor has fairly begun, it should be remembered that the patient has greater difficulties than usual to overcome. The physiological softening and dilatation of the birth-canal which occur at normal labors are rarely present to the same degree. Induced labor may then be longer, more painful, and more exhausting. On the other hand, the fact that the child is smaller than in labor at term will prove an advantage at the time of delivery. Every precaution should be taken to maintain an aseptic condition of the patient, because her liabilities to infection by reason of the interference practised are greater than in normal cases. When labor is induced by the use of the bougie or Barnes' dilators, morbidity and mortality rates of the mother should not be higher under antiseptic precautions than normal. The dangers to the child are greater than usual because of the possible failure in dilatation and also because of the necessity often arising of operative interference in the delivery. If induced labor be delayed, the child will frequently perish from pressure of the uterus upon it, or from inspiration pneumonia coming on shortly after delivery, and occasioned by the entrance of the secretions from the vagina into the respiratory passages as labor progresses.

CHAPTER XXIV.

MULTIPLE PREGNANCY.

When the genital tract of the woman contains more than one impregnated ovum the pregnancy is multiple or plural. Usually the ova find lodgment and develop in the uterus; occasionally one develops in the uterus and one in the Fallopian tube; rarely there is multiple ectopic pregnancy. When there are two ova the pregnancy is said to be with twins; when three, triplets; with four, quadruplets; with five, quintuplets; with six, sextuplets. One authentic case of mis-carriage with six fetuses is recorded as having occurred in Italian Switzerland, the greatest number on record. Twins occur on an average about once in 100 cases; triplets, once in 8000; quadruplets, once in 400,000. These averages vary greatly in different races and countries.

Two terms are used to express the impregnation of more than one ovum, Superfecundation and Superfetation. Superfecundation refers to the successive impregnation of several ova before an impregnated ovum has reached the uterus and before a second ovulation. This is observed in cases when twins are born of different parentage, one black, the other a light mulatto. It has also been seen in cases where two ova of the same parentage have been found at different stages of development, one in the uterus, the other in some other portion of the genital tract. These cases are explicable by successive coitions by the same or different fathers.

Superfetation refers to the impregnation of a second ovum when the first has already advanced several weeks and has

reached the uterine cavity. A second ovulation, after the first impregnation, would seem necessary to explain superfetation. Superfecundation occurs not infrequently; superfetation cannot occur after the ovular and uterine decidua join, in the fourth month, and probably rarely takes place before.

Twins are most often of similar sex, and more frequently boys. When of the same sex they often resemble each other very closely in physical and mental characteristics. They are rarely of precisely the same weight, although their combined weight exceeds that of a single fetus. The amnion and chorion of one ovum are not infrequently observed to take up considerable space on the fetal surface of the placenta of the other ovum. Decreased nutrition in the second ovum results. Five-sevenths of all cases of twins have but one placenta, this fact furnishing an argument against superfetation. When the sex is the same there is one placenta, with one chorion and two amnions. When the sex is unlike it is not infrequent to find two chorions and two amnions with one placenta, both ova being derived from a single follicle. There is then no vascular connection, each ovum having a separate blood supply. In twins and triplets which develop from one ovum, a circulation by means of villi has been found, forming a third blood system by which the same blood passes through both fetal hearts.

Repeated pregnancies and hereditary tendency to multiple pregnancy are the chief causes of multiple pregnancy. The diagnosis of more than one fetus is possible only by careful attention to the details of diagnosis by palpation and auscultation. Women pregnant with more than one fetus have naturally larger abdomens, are more liable to suffer from varicose veins and edema, and often experience greater discomfort than in single pregnancy. When the abdomen is examined and two fetal heart-sounds in distinctly different

areas can be heard, and three greater fetal parts, one head and two breeches, or two heads and one breech, can be plainly outlined, a diagnosis of multiple pregnancy may be made. The patient's impressions, and any less positive data, are worthless in forming an opinion. At the time of labor, when the uterus remains large, after the birth of one child, and when a second can be felt on vaginal examination, twins may be diagnosticated. The possibility of twin pregnancy has led to the invariable custom, with careful obstetricians, of ligating the placental extremity of the umbilical cord, at labor, to prevent hemorrhage from the placenta. The diagnosis of multiple pregnancy is not often easily made, and a positive opinion should not be given without evidence afforded by thorough examination.

Pregnancy rarely goes to full term when more than one fetus is present. The over-distended condition of the uterus renders it more than usually sensitive to reflex irritation, and labor pains are easily excited. Abnormalities in the membranes and placenta and polyhydramnios are often present in multiple pregnancy. One fetus not rarely kills the other by pressing it against the uterine wall, the fetus which perishes becoming flattened, thinned, and shriveled, hence called *fœtus papyraceous*, or parchment-like fetus. Monsters without heads, acephalous monsters, occur in multiple pregnancies.

The position and attitude of the fetuses in twin pregnancies are usually one presenting by the head, the other by the breech. Less often both present by the breech or head. Labor in multiple pregnancies is slow in the first stage, because the cervix dilates slowly and the lower uterine segment is not readily formed. The second stage is often short, the small size of the children rendering their expulsion easy. In the third stage the over-distended uterus may contract imperfectly and placental retention and post-partum hemorrhage are not infre-

quent. If the position of both twins is not favorable for prompt expulsion, the imperfect dilatation of the cervix and lower uterine segment threatens the life of the second twin by pressure.

In conducting twin labor the obstetrician should be prepared to deliver the second twin promptly if there is but one fetal sac ; where there are two, and the second is unruptured after the birth of the first twin, there is less need of prompt delivery. Twins may become so intertwined that spontaneous delivery is impossible ; uterine contractions continuing and retraction of the upper uterine segment taking place, the twins become firmly fixed, and in their abnormal position are said to be "locked." When one twin presents by the head and the other by the breech, the body of the first (breech presenting) twin may be expelled ; both heads enter the pelvic cavity at once, the first head is in extension, the second flexes, and the chin of the first and occiput of the second become wedged into the pelvic brim. A similar impaction may result when both heads present. When the mother's pelvis is large, the amniotic fluid abundant, and the membranes rupture suddenly while the patient is erect, prolapse of fetal limbs and cords may result. Transverse position of one twin may also occur.

The diagnosis of multiple pregnancy is often made for the first time after the birth of the first fetus. If the physician's suspicions are aroused, he should at once make a thorough examination, if necessary introducing the greater portion of the antisepticized hand. If the second fetal sac is unruptured, good uterine contractions should be secured by gentle friction, and labor will proceed spontaneously. If the sac of the second fetus has ruptured and the second twin is not born promptly, the forceps may be applied if the vertex presents ; if the face presents or the shoulder, immediate version is indicated, with extraction by the breech.

In complicated presentation and prolapse of the limbs and cords, the antiseptized hand, introduced under complete anesthesia by chloroform, is the most speedy and certain instrument. In locked twins, the first precaution must be to determine the condition of the uterine muscle. If the contraction ring be found high in the abdomen, uterine tetanus being present, the patient should be completely anesthetized by chloroform, and a catheter having been passed and the bladder emptied, a cautious attempt should be made to dislodge impacted parts. Only the most gentle manipulation is permissible, as uterine rupture is easily produced. Failing in this, the physician must perform embryotomy on the first twin in the interests of the second. The circumstances of the case and the operator's judgment will determine just what procedure is best. We have succeeded in a difficult case of locked twins, in which the body of one twin was born, its head being locked with that of the second, by decapitating the first twin, pushing the severed head up into the uterus, delivering the second twin by forceps, and then the severed head. Thorough antiseptis and precautions to prevent hemorrhage and secure good contraction of the uterus are imperative in these cases.

CHAPTER XXV.

THE PATHOLOGY OF PREGNANCY.

ECLAMPSIA.—By eclampsia is understood a convulsive state on the part of the mother, caused by the circulation in the blood of irritating and noxious materials which excite the nerve centers. These irritating substances result from failure or deficient action of the organs of elimination. In different cases, one or other organ seems most deficient. In some, the kidneys are greatly at fault, in others, the liver, and in others, the intestines and skin. It is usually impossible to ascribe to any one organ the entire causation of eclamptic convulsions, but probably all of the emunctories are in a measure at fault. The clinical proof that such is the origin of eclampsia is found in the fact that patients recover best under methods of treatment which tend, while narcotizing the nervous system, to procure speedy and thorough elimination.

Eclampsia is most frequent in primigravidæ, especially those beyond thirty years old. Predisposing causes are such as produce progressive mal-assimilation with enfeeblement of the nervous system. Several causes render the pregnant woman especially liable to mal-assimilation and toxemia from substances not thoroughly assimilated. Anatomically, the pressure of the enlarged uterus may occlude partially the ureters, thus damming up the urine, producing chronic congestion and impaired functions in the kidneys. Since attention has been drawn to a toxic condition as producing eclampsia, cases have been observed in which

icterus, enlargement of the liver, and general symptoms of ptomain poisoning were found, indicating that failure in those functions of the liver which have to do with the production of the blood was present. It must be remembered that the kidneys are not the only organs whose failure to perform elimination properly produces eclampsia. The practitioner must not expect to find urine loaded with albumin and casts in all cases of eclampsia. Many of the fatal cases have but a small percentage of albumin and few casts in the urine. The kidneys of a large proportion of pregnant women are engorged during pregnancy, producing what is called "the kidney of pregnancy. Serum albumin and hyaline casts are not infrequently found in the urine during pregnancy. In fact, cases in which the urine is loaded with casts and albumin not infrequently recover from eclampsia, while others, whose urine was almost free from albumin and casts, die with very little remission in the violence of their symptoms. It would seem that it is not the presence of albumin and casts, but that of ptomains, which proves dangerous.

The diagnosis of threatened toxemia is to be made by a careful observation of the patient's condition. The physician should *know* whether the bowels move properly ; the quantity and character of urine passed ; the condition of the skin, and, as far as possible, whether the lungs are bearing their share in elimination. Gentle exercise in the open air, with good ventilation in dwellings, is not to be neglected in preventing toxemia.

The premonitory symptoms of eclampsia are those of poisoning of the nervous system ; the cerebrum acts deficiently, the patient is slightly stupid, apathetic, or irritable ; the special senses are disordered ; there are flashes of light or specks before the eyes ; there is diminished acuteness of hearing ; there is sometimes disordered taste or smell. Frontal head-

ache is often complained of, and a vague feeling of lassitude and inquietude is often present. The bodily functions are sometimes performed with a fair degree of efficiency, and, again, the action of the kidneys, intestines, and skin is somewhat below the average. Just preceding the attack it is not uncommon for the cerebrum to be considerably benumbed, so that a patient may enter a hospital on the verge of an eclamptic seizure, and afterward be unable to recall any circumstances connected with her admission.

The eclamptic seizure comprises tonic and clonic spasms. The expression of the patient's face becomes suddenly staring and unnatural, the muscular system is thrown into a tonic spasm, a deep breath is taken, followed by clonic spasms, often sufficiently powerful to shake a patient's bed and exhaust her greatly. The jaws are clinched, the tongue may be bitten between the teeth, and, as the stage of clonic spasms ceases, froth and mucus from the trachea and bronchi gather about the mouth and nostrils. Following the clonic spasms, a period of coma supervenes, of greater or less duration. After this the patient may become conscious until the advent of the next eclamptic fit.

As the spasms are repeated, the tremendous muscular activity of the clonic stage produces exhaustion and rapid decomposition of the muscle substance. The products of this decomposition, added to the poisonous materials already circulating in the patient's blood, increase the violence and extent and duration of her spasms. The uterus is generally excited to activity, and uterine contractions bring on labor, which is frequently rapid and violent. The fixation of the diaphragm and distention of the lungs during the stage of spasms and coma favor pulmonary edema. From the same causes cerebral congestion supervenes. The nervous system, excited and depressed by the poisonous materials circulating in the blood, becomes gradually exhausted, and paralysis of the heat center

is followed by a rise in temperature. Paralysis of the sympathetic causes excessive cardiac action, with rapid pulse and subsequent exhaustion and heart-failure. Arterial tension is increased by the irritation of the altered blood until the stage of paralysis and exhaustion is reached, and the arterial wall loses much of its contractile force. Cerebral edema and effusion into the ventricles of the brain assist in overcoming the nervous system. Death results in deep coma, with progressive failure of the vital nerve centers. Other causes of death occurring during or after eclampsia are, exhaustion, septic infection, and sudden heart-failure with development of heart-clot.

TREATMENT.—The treatment of eclampsia resolves itself into prophylaxis and the treatment of the patient during the convulsions. From what has been said, it can readily be understood that the prophylactic treatment must be addressed to furthering and maintaining a proper elimination. It should be the invariable custom of the physician to examine the urine of patients at intervals of two or three weeks during pregnancy. Especial attention should also be given to the regular and proper action of the intestines and skin, and nutritious and easily assimilated diet should be advised, with the avoidance of unusual and prolonged exercise and exposure to damp and cold. The practitioner should remember that the presence or absence of albumin in the urine is not of great significance as regards the occurrence of eclampsia. The most valuable method of studying the condition of the kidneys is by a microscopic examination of the urinary sediment. Should granular or fatty casts be found and should they persist, and albumin also be present, there can be no doubt but that the kidneys are at fault.

The diet best adapted for patients threatened with eclampsia is milk. It is often difficult, however, to restrict patients to this only, as many soon acquire an intense disgust for this

article of diet. Highly nitrogenous foods should be avoided, and also an excess of sugar and fat and any substance liable to derange the action of the liver and intestines. If the patient cannot be restricted to milk, soft-boiled eggs, fish, white meat of fowls, fruits, vegetables, stale bread, and the use of an abundance of soft drinking water should be advised.

To secure proper action of the intestines, it will often be necessary to prescribe laxatives. Salts should be avoided, as it has been ascertained that potassium salts especially act as irritants in the blood in these conditions and hence favor convulsions. Colocynth, senna, compound licorice powder, with the occasional use of small doses of calomel, are indicated. Glycerin and gluten suppositories and occasional enemata may be employed to assist in keeping the bowels regular. The action of the skin should be maintained by frequent bathing in tepid or warm water. The fabric worn next to the skin should be woolen, to promote a constant and free circulation of blood in the skin, thus tending to relieve the viscera from congestion. Alcoholic liquors should be avoided as beverages, and also the use of tea and coffee in excess, and any narcotic substance. The patient will avoid prolonged and fatiguing exertion, such as difficult journeys, and, if possible, should pass her pregnancy in a dry and equable climate.

In proportion as the severity of the symptoms increases, the practitioner may employ more active measures to secure elimination. The best of these consists in arousing the activity of the skin vigorously by the use of a hot bath. The patient should be in a tub of water at a temperature of 80 or 90° F., and the temperature be then raised until the limit of endurance is nearly reached. While in the bath she should drink freely of hot water, and after leaving the bath she should lie wrapped in blankets for a couple of hours.

There is no one drug of value as a preventer of eclampsia, and the temptation to prescribe sedatives and narcotics should be strenuously opposed, while the cause and pathology of the condition will give the practitioner an accurate guide for treatment in the indication to further and maintain elimination.

The treatment of eclamptic convulsions consists first in so narcotizing the patient as to modify the violence of the convulsions, thus preserving the nervous system from rapid destruction, and in securing prompt and thorough elimination. Two narcotics are of especial value, chloroform and chloral. Morphia is also often employed, and has been used with the best possible results. The administration of chloroform is of primary importance, as no other narcotic so promptly controls the convulsions. If possible, the task of giving chloroform should be entrusted to one person only, who should sit beside the patient, ready to administer the anesthetic at the slightest indication of the convulsion. To prevent the patient from biting her tongue, a folded handkerchief or napkin should be placed between the jaws. A clean handkerchief or napkin may be used as an inhaler, and sufficient chloroform be poured upon it to secure a speedy and positive effect. Chloral may be given by rectal injection in doses of 30 or 40 grains, repeated at intervals of two or three hours, until from 60 to 90 grains have been taken. Morphia may be administered hypodermically in doses of one-fourth or one-half a grain, and in combination with atropia when a tendency to respiratory failure is present.

The subduing the violence of the paroxysms, however, will be useless to save the life of the patient unless prompt elimination is secured. This is best done by the employment of the hot bath in the following way: the patient is raised upon the sheet on which she lies, and her body placed in a tub of water at a temperature of 90°. Sufficient ground mustard

to redden the patient's skin should be thrown into the water, and the temperature of the bath should be raised rapidly until the tolerance of those whose hands are in the bath has been reached. If symptoms of heart-failure present themselves, digitalis may be given hypodermically while the patient is in the bath. Ordinarily, fifteen or twenty minutes will suffice to keep the patient in the bath. The patient's skin should also be rubbed, and when the skin is thoroughly reddened she should be taken from the bath upon the sheet, a blanket wrapped hastily about her, and laid upon a bed covered with a rubber blanket. Woolen blankets should then be added in abundance, with hot cans at the feet and about the thighs; after a few moments the patient's forehead will be seen to be moistened by perspiration, which will usually become profuse in a short time. Meanwhile, a rectal injection of chloral may be given, and morphia used hypodermically if needed.

To secure elimination in desperate cases, a drop of croton-oil mixed with olive-oil may be placed upon the tongue. It will usually be better, however, if the patient can swallow, to employ calomel as a diuretic and also as a purgative. For this purpose, ten grains of calomel with an equal quantity of soda should be swallowed as soon as possible. This dose should not be repeated but once in thirty-six hours. It may be followed an hour afterward by a laxative injection. The practitioner, meanwhile, should observe carefully the patient's pulse and temperature. If she be threatened with heart-failure, digitalis and strychnia may be given by hypodermic injection. If the pulse continues to rise, remaining above 100, the prognosis becomes correspondingly grave as the case proceeds. It is not unusual to observe a temperature of 103 or 104° F. in these cases, usually falling under the influence of the hot bath. If stimulants are required, whisky and milk, two ounces of each, may be warmed and given by rec-

tal injection. In apoplectiform cases where plethora is excessive, bleeding may be practised with marked temporary benefit. No permanent improvement can be expected, as this expedient will not exercise more than a temporary influence upon the patient.

The effect of eclamptic convulsions is usually to bring on labor. If the convulsions be violent the uterine muscle often shares in the general muscular activity. Labor is sometimes rapid and precipitate. When the practitioner finds that labor has commenced, he will do well to further its completion. Thus, when dilatation is sufficient, the forceps may often be used to advantage, or version may terminate the labor. If, however, dilatation is not complete, and no signs of labor are present, no effort should be made to forcibly dilate the cervix and empty the uterus. Such a procedure would simply add to the reflex excitability of the general nervous system, and further a fatal result for the mother and child. After labor the convulsions may continue, although this is exceptional and not the rule.

The prognosis of eclampsia has improved since our knowledge of the pathology of the affection has become more accurate. While formerly more than one-third of all eclamptic patients died ($33\frac{1}{3}$ per cent.), under treatment planned upon indications furnished by the pathology of the affection, but one-thirteenth ($7\frac{1}{2}$ per cent.) died. Eclampsia occurring during the first stage of labor is more fatal than that which comes on before labor has begun. The death of the child before labor begins improves the mother's chances, probably by removing a source of uterine irritation in fetal movements and the waste products of fetal digestion.

In eclamptic patients an occasional error may arise through the existence of hysteria complicating nephritis. Thus, in a recent case in which nephritis was well marked, the patient was observed to have paroxysms simulating eclamptic seiz-

ures. A few moments' careful observation detected the evident counterfeit. It is interesting to observe that although this patient had well-marked nephritis she never had a genuine eclamptic seizure.

Epilepsy may simulate eclampsia very closely. The examination of the urine and the results of treatment will usually enable the obstetrician to make a differential diagnosis.

The prognosis for the child in eclamptic cases is rendered unfavorable through the usual rapidity and precipitateness of the labor. In spite of all this, however, children are frequently born and live after labor occurring during eclamptic convulsions. A mother who has had eclampsia should not nurse her child.

NEPHRITIS OCCURRING DURING PREGNANCY.—While toxemia and eclampsia are well recognized conditions, it has been customary to ascribe all eclampsia to kidney failure. This is but partially true, and nephritis during pregnancy is to be recognized as an affection distinct from toxemia and eclampsia, although predisposing to them. The causes producing nephritis in the non-pregnant operate more readily during pregnancy, from the burdened condition of the mother's emunctories, owing to the demands of the fetal economy ; exposure to wet and cold, poor and improper food, and the causes which produce an altered and irritating blood, resulting in arterial disease and ultimately kidney failure, commonly cause nephritis. The symptoms are those usually observed, casts and albumin in the urine, with edema, lessened amount of urine, and uremia.

A point of especial interest to the obstetrician is the relation which nephritis caused by disease of the arterioles of the kidney bears to the life of the fetus. While the pathology of the condition is not perfectly demonstrated, yet observation seems to show that while the arterioles of the mother's kidneys are becoming gradually occluded by diseased products, a

similar change is going on in the small vessels of the placenta. This process gradually occludes areas in the placenta, thus robbing the fetus of portions of its blood supply and gradually causing death by asphyxia. In the interests of mother and child, a time must come when the induction of labor is justified in the interests of both. Women having well-marked nephritis are not apt to recover perfectly after labor and are more liable to eclampsia ; the fetus of such a mother often dies in the uterus before labor comes on, or perishes soon after birth. It is difficult to determine the exact time at which to induce labor, and this can be known only from an accurate and prolonged observation of the case. But it is certainly true, in the present stage of our knowledge, that pregnancy should be interrupted in a patient having well-marked symptoms of nephritis which do not abate on treatment.

The treatment of nephritis, during pregnancy does not differ from that in the non-pregnant. The warm and hot bath ; proper hygiene ; laxatives which produce free, watery stools ; the use of pure, soft drinking water, are the groundwork of treatment. It should be remembered that it is not the amount of serum albumin in the urine which indicates danger, but casts and kidney *débris*, and hence careful microscopic examination of the urine is more valuable than chemical tests.

CHAPTER XXVI.

INFECTIOUS AND CARDIAC DISEASE DURING PREGNANCY.

THE ACUTE INFECTIONS OCCURRING DURING PREGNANCY.—Great interest has attached to the acute infections since bacteriology has thrown new light upon the causation of such maladies. The question naturally suggests itself, can the germs causing the acute infections pass through the villi of the chorion and the inter-villous placental septa and infect the fetus as well? At the present time an affirmative answer can be given to this question as regards typhoid infection, malaria, pneumonia, syphilis, tuberculosis, and gonorrhea. It is also stated that cholera and yellow fever are transmitted from mother to child, the latter in such a manner as to convey immunity from subsequent attacks upon the fetus which survives, while in the uterus, an attack of the disease.

The exanthematous infections are conveyed to the fetus, variola, measles, scarlatina, and erysipelas frequently causing fetal death before or after delivery.

It seems to have been demonstrated that pregnancy neither exempts nor exposes a woman to the acute infections. She incurs greater dangers than the non-pregnant from abortion, from hemorrhage, and from the fact that in some of the infections mentioned, as variola, scarlatina, and erysipelas, the micrococci which cause puerperal pyemia frequently develop in company with the germs of the original infection, and hence puerperal sepsis is added as a complication.

The symptoms of these diseases in pregnancy do not essentially differ from those in the non-pregnant. The symp-

toms of abortion are likely to be added to those of the original infection, and should not fail to attract the physician's attention. As regards prognosis, if the patient's temperature does not remain long at or above 104° F. her chances and those of the fetus are not desperate, so far as fever is concerned. The occurrence of abortion is unfavorable; a premature labor is not especially dangerous. The prognosis of abortion or premature labor occurring during an acute infection will be greatly influenced by the observance or disregard of antiseptic precautions. As there is, in these cases, especial danger of the development of micrococci, so there is indicated especial precaution. If hemorrhage be prevented, the patient's strength be conserved, and sepsis does not complicate the case, a better prognosis can be given than would otherwise be justifiable.

The treatment of the acute infections during pregnancy is that proper in the non-pregnant, with especial attention to the reduction of temperature. No theory or method of treatment appropriate in such cases is contraindicated because of pregnancy, but whatever will best further the mother's interests will be best for the child. Quinin may be given freely during malarial infection without fear of producing abortion. When abortion or labor has begun, quinin, in common with many tonics acting upon the nervous system, is most efficient in strengthening the contraction of the uterus. It will rarely cause abortion or labor before such a process has actually commenced. Stimulants may be used as freely as needed with the best results. Abortion should not be intentionally produced, as it increases the mother's danger.

In variola and syphilis, preventive medication may be employed advantageously for the interest of the fetus. Vaccination should be performed so soon as variola is suspected, and pregnancy is no counter-indication to vaccination in all cases. The prompt use of mercury in recent syphilitic in-

fection is demanded in the interests of the fetus. Preventive inoculation with tuberculin does not as yet give promise of success in threatened fetal tuberculosis. Gonorrheal infection during pregnancy demands prompt treatment. The vagina should be thoroughly douched with a solution of bichlorid of mercury, one to one thousand, followed by boiled water. Iodoform is then to be thoroughly applied to the mucous membrane, a tampon of iodoform gauze, which distends the vagina moderately, is especially useful. Injections may be given to advantage through a cylindrical speculum. The early destruction of the gonococci is desirable, as they tend to nest in the folds of the vaginal mucous membrane, and thus infect the mucous surfaces of the fetus during labor. They also threaten the mother with infection of the urinary tract. Continued gonorrheal inflammation during pregnancy causes in many cases adherence of the fetal membranes to the cervix and os; at labor premature rupture of the membranes results, and a tedious and difficult labor may follow.

CARDIAC DISORDERS DURING PREGNANCY.—The physiological changes occurring in normal pregnancy tend to exaggerate a diseased condition of the heart before pregnancy. The tax put upon the mother's circulatory system by the needs for fetal nutrition favors, in advanced cardiac lesions, failure in nutrition in the hypertrophied heart muscle and dilatation occurs, increasing to a dangerous degree during labor. If the valvular lesion be slight, compensation may be maintained, and no immediate harm follow pregnancy and labor. Repeated pregnancies and labor should be avoided; in fact, women with well-marked cardiac lesions should not become pregnant. During pregnancy violent exertion must be avoided, and chilling the surface of the body. The clothing should be perfectly loose; the skin, bowels, kidneys, and lungs should be kept in proper activity. The nutrition of the heart muscle is to be maintained by attention to nutrition, with the

use of cardiac tonics. The sensation of breathlessness, which so often annoys pregnant women, should be explained to the patient, and should not be allowed to cause undue apprehension. The physician will inform himself by physical examination of the actual condition present. At labor the patient's dyspnea is best relieved by the hypodermic use of ether, atropia, strophanthus, or digitalis and strychnia, with inhalations of chloroform or ether. If possible, oxygen should be in readiness for inhalation. Labor may be judiciously expedited by forceps or version. Hemorrhage is to be feared, and possible thrombosis after delivery. The relief afforded by anesthetics, especially chloroform, in cases of labor with advanced valvular lesions, is surprising and immediate. In common with other disorders, cardiac lesions are not incurred by pregnancy, but are aggravated by it. Endocarditis, caused by rheumatism, is most frequent, atheroma and aneurysm are less commonly observed than in men.

The occurrence of failure of nutrition in the heart muscle, with beginning dilatation, may justify the production of abortion.

CHAPTER XXVII.

AFFECTIONS OF THE GENITO-URINARY ORGANS OCCURRING DURING PREGNANCY.

The condition of pregnancy predisposes to inflammation of the mucous membrane of the vagina and cervix. Simple engorgement, with increased secretion of mucus, is almost a constant condition of the vaginal mucous membrane. Unless precautions are taken to insure cleanliness, micrococci will breed in the decomposed secretions, and inflammation and ulceration will result. The symptoms of such conditions are vaginal discharges, and pain and irritation upon micturition and walking. Treatment should be addressed first to destroying micrococci and next to maintaining a condition of cleanliness by vaginal injections. Bichlorid of mercury, 1 to 5000 or 2000, or creolin, 1 teaspoonful to the quart of water, will be useful at first, to be followed later by injections of boric acid or alum in dilute solutions. The treatment of gonorrhea has been considered under the acute infections.

When micrococci invade the bladder, a trying complication of pregnancy, and one likely to occasion trouble after labor, is present. Urethritis, cystitis, pyelitis, and suppurating kidney have all followed this accident. When pus is found in the urine the bladder should be douched twice daily with creolin solution, a teaspoonful to the pint of warm water. Internally salol may be given, 10 grains three times daily, or boracic acid, 15 to 20 grains three times daily. Milk diet, if possible, with rest in bed and careful disinfection of the vagina, will also be of advantage. It is of interest to note that cystitis of moderate degree may be present with an acid

urine in the case of women. In pyelitis, catheterization of the ureters is of value to determine which kidney is affected ; in severe and prolonged cases lumbar incision and drainage of the kidney are indicated.

Displacement of the uterus and vagina are among the complications of pregnancy. Prolapse of the vaginal walls is usually the result of repeated parturitions, with a relaxed condition of the tissues.

Prolapse of the uterus may occur early in pregnancy, accompanied by endocervicitis ; although previous distention of the vagina during labor is an exciting cause, it may be observed in primigravidæ. Its symptoms are sensations of weight and dragging, the presence of a tumor, with interference with the functions of the bladder and rectum. Abortion may result if the case be neglected, with septic infection following it.

Replacement of the prolapsed organ and its retention in its normal position can usually be effected by manipulation. An antiseptic tampon is a convenient and efficient agent for retaining the uterus in its normal position. Surgeon's lint, in strips three inches wide, smeared with an antiseptic ointment, is a useful material for tampon. Hard and elastic pessaries are not contraindicated in these cases, although lint or tampons of wool are preferable. In extensive prolapse of the vaginal walls, with laceration and erosion of the cervix, colporrhaphy and trachelorrhaphy may be performed without fear of abortion, if undue violence be avoided and antiseptic precautions be taken to secure union by first intention.

RETRO-DISPLACEMENT OF THE PREGNANT UTERUS.—It is not uncommon for the uterus to tip backward early in pregnancy. The frequency of backward displacements in the non-pregnant, tight clothing and corsets worn during pregnancy, and relaxation of the supports of the uterus as its weight increases, have all been alleged as causes of this con-

dition. Between the third and fourth month, when the uterus rises out of the pelvis, such a displacement is usually spontaneously corrected ; if inflammation and adhesions exist, binding the uterus down, abortion or death of the fetus and impaction of the uterus in the hollow of the sacrum will result.

The symptoms of retro-displacement of the pregnant uterus are frequent and irritating micturition, constipation, and pain over the sacral and gluteal regions. Digital examination will confirm the physician's suspicions.

The treatment of this complication of pregnancy, in mild cases, consists in emptying the bladder and rectum, anteverting the uterus by pressure with the fingers in the vagina or rectum, and fitting a pessary, either of hard rubber or some softer material, to retain the uterus in position. In replacing the uterus, violent manipulation must be avoided ; if the patient be placed in the knee-chest posture the uterus will generally go easily into place. A support will not be needed after the fourth month, when the uterus has risen above the pelvic brim.

In impaction of the pregnant uterus in the hollow of the sacrum, persistent but gentle efforts are needed to dislodge it from its abnormal position. The cervix may be grasped by a tenaculum forceps and drawn downward and backward, while with the fingers of the other hand an effort is made to dislodge the fundus. If the uterus cannot be replaced, its size must be lessened by producing abortion ; this is best accomplished by introducing a sound, rupturing the membranes. When the uterus is bound down by adhesions, impacted in the hollow of the sacrum, and death and decomposition of the fetus ensue, the condition is one of gravity. The obstetrician is then obliged to forcibly break up such adhesions, replace the uterus, and empty and disinfect its cavity. The uterus has been extirpated through the vagina for the relief of this condition with success.

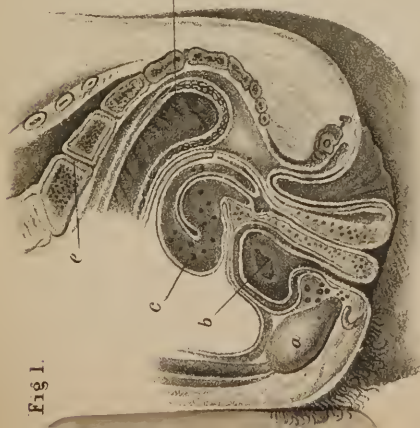


Fig 1.

Marked ante flexion of the Uterus.

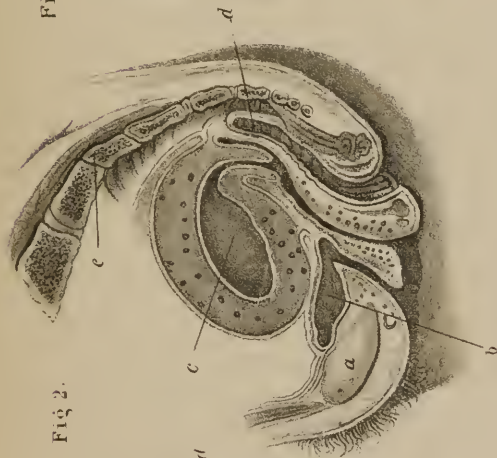


Fig 2.

Ante flexion of Uterus soon after delivery.

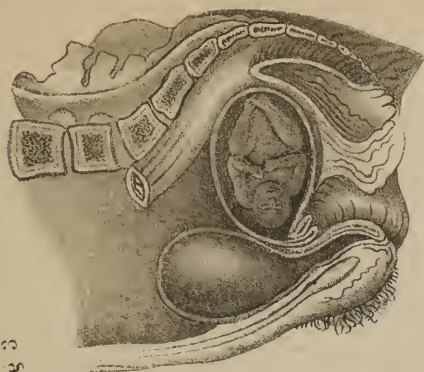


Fig 3

Retroversion of the Gravid Uterus at the Fourth Month. (Diagrammatic)

Flexions and Retroversions of Uterus. 1. (Martin)

ANTERIOR DISPLACEMENT OF THE PREGNANT UTERUS.—

In women whose abdominal walls are ill developed, weakened by many pregnancies, and in pregnant women having contracted pelves so small that the uterus cannot enter the pelvic cavity, exaggerated anteversion of the pregnant uterus has been observed. Its symptoms are interference with the function of the bladder, first frequent micturition, then infrequent difficult micturition, and finally the retention of the contents of the bladder with almost constant dribbling of urine. The abdomen protrudes as the uterus grows larger, until the German term of “hanging belly” seems appropriate. Pain and “dragging” are felt in the sacral region.

The diagnosis of the condition is readily made by examination after the bladder has been emptied by a catheter. In early pregnancy a ring pessary will usually correct the malposition; later in pregnancy a broad abdominal band will be found useful.

RELAXATION OF THE PELVIC JOINTS is an occasional complication of pregnancy. Although these joints become more vascular, and contain more synovial fluid than in the non-pregnant, it is rare for their mobility to become excessive. The pubic joint is most affected in these cases, and can be felt to move freely when the patient steps. Walking may become impossible, and standing be scarcely endured. There is no one cause which seems responsible for this condition, and hence no treatment except mechanical devices for partly immobilizing the joint is of avail. The application of a broad, well-fitting bandage of strong material, passing around the entire pelvis from the trochanters above the crests of the ilia, is usually efficient. A plaster-of-Paris bandage has been necessary in severe cases, and in others rest in bed.

THE NERVOUS SYSTEM.—Pregnancy affects the nervous system, often profoundly. The reflexes are exaggerated; the trophic and secretory nerves are more active and more easily

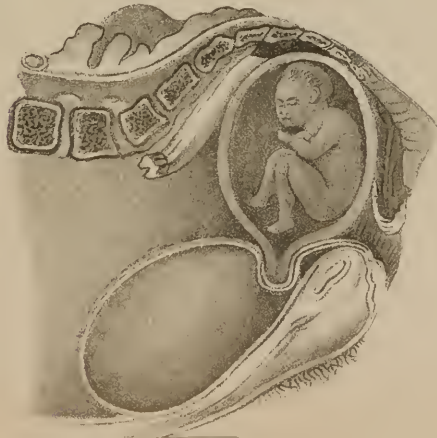
excited. The brain shares in the generally sensitive condition of the patient, and the pregnant woman is often easily frightened, irritable, and usually apprehensive. A generally stimulating effect is observed with others, and such women feel better than when not pregnant. Such patients have better appetite and digestion than before pregnancy. The sensitive condition of the sympathetic nervous system causes cardiac palpitation, dyspnoea, flushing of the features, and often perspiration on very slight provocation. Salivation, discoloration of the skin about the face and often the genital organs, and, in many cases, excessive nausea and vomiting, are all to be referred to hyperesthesia of the various portions of the nervous system, caused by pregnancy.

The extremes of these nervous affections are seen in chorea and insanity, recurring during pregnancy. It is rare that either is caused by pregnancy, but results in a pregnant woman predisposed to either of them. The treatment of chorea in the pregnant woman is essentially that in the non-pregnant. Abortion should be resorted to only when other remedies have failed, and premature labor in the choreic rarely terminates spontaneously. Arsenic and other tonics to the nervous system act very favorably in these cases, especially when accompanied by disciplined nursing.

In a woman predisposed by heredity to insanity, pregnancy not infrequently develops melancholia, with acute mania at labor. In those not predisposed to insanity, pregnancy may be accompanied by melancholia persisting for some time after delivery, but rarely followed by mania.

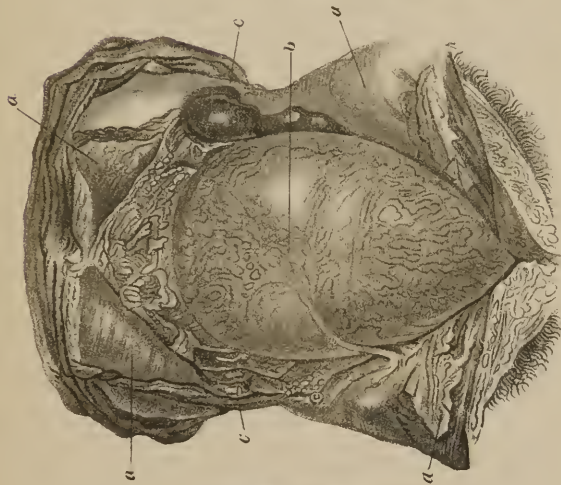
Labor in the actively insane demands careful attention. Such patients are often strangely oblivious to pain, and labor may proceed without demonstrations of suffering. Anesthetics and sedatives are required in these cases, and delivery should be conducted under complete anesthesia. Constant watchfulness is to be exercised, for suicidal tendencies and

Fig 1



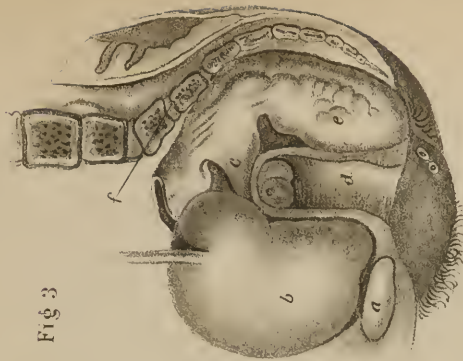
Retroversion at Commencement of Fifth Month with Distention of Bladder.

Fig 2



Distention of the Bladder by retained Urine, Consequent upon Retroversion.

Fig 3



Retroflexed Uterus bound down to the Rectum by Exudation Membrane.

Flexions and Retroversions of Uterus. II. (Martin)

efforts to injure the child are not infrequent. Judicious, kindly restraint is imperative in these cases, and the physician may find his strength and patience taxed to their utmost. It is sometimes necessary to partially anesthetize the patient to give even a douche. The prognosis in those not predisposed to insanity is good, under long-continued and rational treatment. Seclusion, tonics, cheerful and assiduous kindness, and the presence of the child usually cure these cases. In those with whom insanity was to be feared, pregnancy is simply the exciting, but not the predisposing cause; any one of many might have precipitated mental disease. The prognosis for recovery in such cases cannot be given as hopeful.

Hysteria and epilepsy are neither caused nor greatly aggravated by pregnancy. Both are to be treated as in the non-pregnant. Hysteria may deceive the practitioner by simulating labor and even eclampsia; close observation will detect the deception. The diagnosis between eclampsia and epilepsy will be made by the history, when available, and by the examination of the urine; the epileptic has had fits before pregnancy; her paroxysms do not grow more frequent or violent; she rarely dies during or after labor.

PERNICIOUS VOMITING OF PREGNANCY.—In some cases, without anatomical lesion to account for the disorder, the nausea and vomiting of pregnancy become so exaggerated as to threaten the patient's life. When the examination of the patient fails to detect irritation or inflammation about the uterus; when the womb is in normal position, and no gastric or kidney disease can be detected, the cause of the nausea must be ascribed to a hypersensitive condition of the nervous system. Disease of the fetal appendages has been found in some cases of pernicious vomiting, but the relationship of cause and effect has not been demonstrated. Some observers have made hysteria the cause of nausea and vomiting, although proof that such is invariably the case is not forthcoming.

In these cases remedies are most successful which act as sedatives to the nervous system. The bromids, chloral, morphia, antipyrin, antifebrin or phenacetin, cocain or valerian, are indicated. Chloroform, internally and by inhalation, is sometimes successful. Locally, counter-irritation over the epigastrium; heat to the cerebrum and cerebellum; galvanism along the spine and epigastrium, or an ice-bag upon the abdomen are measures which have been of value in different cases. When other treatment is unavailing, and the patient is threatened with collapse, pregnancy must be terminated. Every method of feeding which modern nursing can suggest should be exhausted; the patient can be nourished by the rectum for some time by the administration of nutrient enemata.

THE MOTHER'S BLOOD DURING PREGNANCY.—The view that the blood becomes more watery during pregnancy, with a large number of white corpuscles, is probably not true. Aside from the condition of anemia which follows the expulsion of the fetus, and the loss of blood so often seen during labor, the healthy pregnant woman may be said to be in a condition of slight plethora, and not anemia. Pernicious anemia is occasionally observed and forms a serious complication of pregnancy. The symptoms of this condition are pallid skin, rapid pulse, dyspnea, lassitude, and often edema. Microscopic examination of the blood reveals a much lessened quantity of hemoglobin, red corpuscles which are smaller and less perfectly formed than normally, and threads of fibrin stretching across the field of the microscope. Blood counts show a lessened number of red corpuscles, lessened hemoglobin percentage, sometimes increased number of white cells. When not pregnant, these patients are simply chlorotic; at labor hemorrhage is very slight, the labor pains often deficient, and delivery instrumental. The child is pale, chlorotic, and of feeble vitality. In other cases the child is

strong, its blood being found normal on microscopic examination.

The treatment of this condition is best accomplished by the persistent administration of oxygen by inhalation and arsenic in small doses, with nourishing food. Peptonized milk, soups, broths, raw meat in finely chopped and seasoned preparations, and eggs are of especial value. The importance of oxygen and arsenic must be emphasized, as they are superior to iron and other drugs.

JAUNDICE in parturient patients may be hepatogenic or hematogenic. The former is caused by catarrh of the bile-ducts, with occlusion of the ducts and absorption of bile. It usually accompanies enteritis, and yields to treatment addressed to the secretion of bile and the intestinal tract.

Hematogenic jaundice results from an acute infection affecting the red blood corpuscles and causing their disintegration, with absorption of hematin. Acute yellow atrophy of the liver accompanies profound, malignant jaundice, and is considered by some to be caused by the same infection. Hematogenic, infectious jaundice is but little amenable to treatment; stimulants and tonics are indicated to enable the patient to resist the infection.

DISORDERS OF THE SKIN DURING PREGNANCY.—Pregnant women are often greatly annoyed by discoloration of the skin about the face and genital organs; the facial blemish is known as the “mask of pregnancy,” and is usually of a yellowish-brown color. It is not amenable to treatment and usually disappears after delivery.

Pruritus about the genital organs occasions great suffering in some cases. Thorough cleanliness must be first secured. Hot or cold sponging, sitz baths of warm, but not hot, water; anesthetics, locally applied, and the galvanic current have all been employed. But little more than palliation can be expected until the termination of pregnancy.

VARICOSE VEINS.—Few women pass through pregnancy without dilatation of the veins of the lower extremities, and often the vulva and vagina. Rupture of varicose veins of the vulva and vagina often results in the extravasation of blood into the submucous tissue, without admitting the external air. When dilatation is excessive, rupture may take place at labor or when very slight violence is offered, and free hemorrhage result. The recumbent posture and the use of an antiseptic tampon will control such hemorrhage.

Varicose veins of the lower extremities occasion great discomfort when distention is excessive, and sudden and alarming hemorrhage follows rupture. Before rupture, itching and burning sensations and often an eczematous eruption add to the patient's discomfort. Patients suffering from varicose veins should avoid constipation, and can often derive comfort from some form of support. An elastic stocking or flannel bandage, with frequent bathing in a saturated solution of boracic acid, will often be of great service. Such patients should be instructed in the application of a compress and bandage, and cautioned to avoid rupture of a vein if possible. Garters and clothing which interfere with the circulation in the lower limbs should not be worn.

HERNIA OF THE PREGNANT UTERUS.—In rare cases the pregnant uterus protrudes in the umbilical, crural, or inguinal ring. In umbilical hernia reposition is usually not difficult, and the uterus is retained by an abdominal bandage. Abortion or Cesarean section, if the fetus be movable, is indicated in these cases, with removal of the uterus if it cannot be returned to the abdominal cavity.

PREGNANCY COMPLICATED BY FOREIGN GROWTHS IN THE UTERUS AND PELVIS.—Fibroid tumors of the pregnant uterus usually grow softer and larger as pregnancy progresses. A fibroid polyp which protrudes from the os may be removed, but a less easily accessible tumor should not be disturbed.



Narrowing of the Vagina by an Ovarian Tumor.
(Martin)

a Symphysis Pubis

c Urethra. *d*, Ovarian Tumor. *ee*, Rectum. *ff*, Vaginal Walls.

Cancer of the cervix of the pregnant uterus is to be removed as in the non-pregnant. Abortion is not inevitable upon operation in such cases, and the patient should not be allowed to suffer by delay.

Still more imperative is the obstetrician's duty in pregnancy complicated by ovarian tumors. So soon as a diagnosis can be made such a tumor should be removed. Under antiseptic precautions the prognosis for recovery and continuation of pregnancy is excellent.

CHAPTER XXVIII.

ACCIDENTAL HEMORRHAGE DURING PREGNANCY.

The term accidental hemorrhage may be applied to bleeding from a ruptured varicose vein or to oozing of blood from an inflamed cervix uteri. By accidental hemorrhage, however, is commonly understood bleeding from accidental and premature detachment of a normally implanted placenta. We shall see that the placenta may be so attached that its separation is inevitable when the uterus begins to dilate, and hence unavoidable hemorrhage is the principal symptom and greatest danger of placenta previa. But we understand by accidental hemorrhage that the placenta, although normally situated in the uterus, may become partly or wholly detached during pregnancy, and hemorrhage follow.

The causes of such separation are a diseased and friable condition of the lining membrane of the womb or of the placenta itself, or violence direct and indirect. If the villi of the chorion are diseased and the decidua which joins them in forming the placenta is friable and wanting in its normal firmness, it will readily be seen that a predisposing cause of importance is present. As an exciting cause violence is most efficient in producing this accident. This may be direct, as a blow or kick upon the abdomen, or indirect, as when a strong emotion or nervous shock causes uterine contraction, which separates the placenta. Occasionally the accident happens without appreciable cause, the patient possibly waking from quiet sleep in pain and hemorrhage.

The symptoms of accidental hemorrhage are distention of the uterus, pain in the abdomen resembling rheumatic or

colic pain, rapid, weak pulse, elevated temperature, and usually a discharge of blood or bloody serum and mucus from the vagina. The blood in this condition may take one of several directions. If the lower portion of the placenta, that nearest the os uteri, becomes separated, blood will flow downward and may force its way between the membranes and appear in the vagina. In such a case no considerable clot will form between the placenta and uterus; and if the patient be put at absolute rest, the separation of the placenta may cease and pregnancy go on to term. If the upper portion of the placenta be separated and a clot accumulates between the wall of the uterus and placenta, blood will distend the uterus, an extensive separation of the placenta will occur, with death of the fetus through asphyxia, and great danger to the mother. The membranes may rupture and blood mix with the amniotic fluid; the presenting part of the fetus may plug up the cervix so tightly that blood does not escape from the uterus. Uterine contractions are usually feeble or absent, pain in the abdomen not being labor pain.

The diagnosis is often difficult. Signs and symptoms of maternal hemorrhage; absence of tumor beside the uterus, which would point to extra-uterine pregnancy whose rupture would cause hemorrhage; the flaccid uterus and alarming prostration should suggest this accident. Rupture from extra-uterine pregnancy usually occurs earlier in pregnancy than does accidental hemorrhage.

The treatment of this condition consists in putting the patient at absolute rest and closely watching her. If she does not improve in strength, her pain diminish, and her pulse grow better, no further delay is permissible, but the uterus must be emptied at once. Barnes' dilators are most useful, with small doses of ergot or strychnia. So soon as the hand or forceps can be introduced, the fetus must be delivered. The hand should then remove the placenta and membranes

and thoroughly empty the uterus of clot. Copious irrigation with hot creolin mixture, and tamponing with iodoform gauze, if the uterus contract poorly, are indicated. Strychnia may be given in $\frac{1}{20}$ or $\frac{1}{10}$ grain doses hypodermically to prevent collapse and secure uterine contraction. As in all cases where blood is lost, the patient's danger from septic poisoning is increased and calls for added precaution from her physician. The maternal mortality of accidental hemorrhage is fifty per cent, the fetal mortality very great.

CHAPTER XXIX.

THE SURGICAL TREATMENT OF COMPLICATED LABOR.

It is sometimes necessary to terminate labor by a resort to surgical operations. Such operations have for their object the saving of the life of the mother and child, or saving the life of the mother at the sacrifice of that of the child.

Under the first heading may be included the Cesarean section, and amputation of the pregnant uterus. By Cesarean section is understood an incision into the abdomen, an incision into the uterus, the extraction of the child with its placenta and membranes, and the closure of the uterus by suture. This operation is of great antiquity, taking its name from the Roman Cesar, who is said to have been born in this manner. Since antiseptic surgery has attained its present perfection, this operation has been revived with excellent results.

The indications for the Cesarean section deserve especial consideration. The child must be living and viable; the mother must not be infected by septic infection, nor can her uterus be the seat of a pathological process which would prevent a uterine incision from healing. There must be such disproportion between her birth-canal and the size of her fetus that the delivery of the latter alive is impossible. The consent of the mother, or, in the event of her being unconscious, of her nearest relative, must be secured. When these conditions are present the success of the operation will depend upon three grounds:—

1st. A knowledge and faithful application of antiseptic precautions.

2d. The co-operation of at least one intelligent assistant.

3d. Adequate closure of the uterine incision.

In regard to the first, the operator should thoroughly antisepticize his hands, instruments, and appliances. The abdomen of the patient should be scrubbed with soap and water, washed with ether and then with a solution of bi-chlorid of mercury, one to one thousand. No antiseptic fluid should be introduced within the abdominal cavity. If it is necessary to wash out the abdomen, it should be done with boiled water at a temperature of 100. If the interior of the uterus is found in a condition requiring disinfection, this can best be accomplished by tamponing it with iodoform gauze, the ends of the tampon emerging through the vagina. The assistant, whose co-operation is essential, has for his function compression of the uterus to prevent hemorrhage. He should also observe the strictest antiseptic precautions by especial attention to cleansing his hands.

The question of the method of closing the uterine incision has occasioned much discussion, and seems finally to have reached a satisfactory solution. When the Cesarean operation was revived by Sænger, it was thought necessary to close the muscular tissues of the uterus, and also the peritoneum covering that organ, by a separate line of sutures. While this is undoubtedly a safe and correct method of operating, yet others have performed the operation successfully by including the peritoneum and muscular tissue in one suture, approximating the edges of the incision with great care. As first performed, the sutures during the operation were not passed through the decidua lining the uterus, but in various operations this has been included in the sutures without disastrous results. It is of the greatest importance, however, that a sufficient number of sutures be used to solidly approximate the edges of the incision. It is of paramount importance that the edges of the peritoneum covering the uterus be

brought carefully into apposition so that they may unite perfectly. Senn practises and advises the following method of closing the uterine incision, the description of which is taken from a recent article by him upon this subject:—

SUTURING OF THE UTERINE WOUND.—This constitutes the most important and prolonged part of the operation. The suturing must be done in a manner that will secure such accurate approximation of the incised and torn surfaces as to arrest bleeding by pressure, and at the same time separate perfectly the uterine from the peritoneal cavity. Only round needles should be used, a small darning needle for the large and an ordinary sewing needle for the fine sutures. Four rows of sutures are used, three of catgut and one of silk. The first row is made of medium-sized catgut sutures, half an inch apart, and including the entire thickness of the uterine wall with the exception of the peritoneum. This row of sutures is intended to bring and hold in contact the surfaces of the wound, and should, therefore, include considerable tissue on each side. After the sutures have been tied there will be found a little gaping between them; this is overcome by applying a continued suture of fine catgut, which should bring in accurate contact everything else except the peritoneum. The next step in suturing is to bring in contact a strip of the serous surfaces, about one-third of an inch in width the entire length of the wound, by a third row of sutures. This row of sutures is intended to invert the serous margin of the wound on each side to the depth of at least one-third of an inch. A small darning needle and medium-sized braided silk are used in applying these sutures. The sutures are made to include the peritoneum and considerable of the muscular tissue, so as to insure a firm hold. The needle is entered about one-third of an inch from the margin of the wound, and is made to emerge a few lines from the edge, when it is made to enter at a corresponding point on the

opposite side and is brought out one-third of an inch from the margin of the wound. Two sutures to the inch will answer the purpose. The third row of sutures is buried by a continued suture of fine catgut, which includes only the peritoneum and subserous connective tissue. If all of the sutures are properly inserted and tied, they can be relied upon in preventing hemorrhage after the removal of the constrictor, even in cases in which the uterus does not contract firmly. The constrictor is now removed and contractions of the uterus secured before the organ is replaced into the abdominal cavity.

The material employed for sutures may be silver wire, catgut, or silk. If catgut be employed, none but the best quality should be used, as otherwise septic infection or loosening of the edges of the incision may result disastrously to the patient. If possible, the patient should be prepared for operation in the manner usual before all abdominal sections. No solid food should be taken for a day before the operation, the bowels should be thoroughly emptied, several antiseptic vaginal douches should be given, and if a suspicious discharge from the uterus persists, the vagina should be tamponed at the time of operation with iodoform gauze. Besides the chief assistant already mentioned, two others will be found useful, with a trained nurse. One of the assistants should give the anesthetic, the other should be ready to devote his entire attention to the resuscitation of the child.

The instruments needed are a scalpel, several pairs of hemostatic forceps, two sizes of curved needles, a needle-holder, and a piece of stout rubber tubing as large as the little finger, two or three feet in length. If the patient have no bronchitis or disease of the kidneys, ether may be employed as an anesthetic, but should either of these complications be present, chloroform may be used. At the time of operation, the nurse should have ready bottles filled with hot water, whisky or brandy, digitalis, aromatic spirits of ammonia. strychnia in

solution, fluid extract of ergot, or a solution of ergotine especially prepared for hypodermic injection, and a solution of morphia. The usual basins and pitchers for washing sponges and for irrigating the abdominal cavity should be in readiness. It is well to have also a fountain syringe with a suitable tube for giving a vaginal douche. In addition, there should be in readiness a small tub filled with hot water for use in resuscitating the child. The patient having been anesthetized, the chief assistant stands beside the operator with the rubber tubing already mentioned within convenient grasp. The operator will desire to incise the uterus upon its anterior aspect about midway between the fundus and the lower uterine segment. The period of labor chosen for operation is preferably the end of the first stage, when dilatation is nearly complete. An abdominal incision of from three to five inches should then be made over the portion of the uterus which the operator wishes to enter. The peritoneum having been incised, two courses are then open for the operator; one is to enlarge the abdominal incision sufficiently to turn the uterus forward out of the abdominal cavity; the other is to incise it as it lies in the abdomen. If the uterus is turned out, towels which have previously been boiled and wrung out of freshly boiled warm water should be laid over the intestines behind the uterus and upon the abdomen, so that the uterus may rest upon them.

Two methods of checking hemorrhage are available at the time of the uterine incision. One consists in drawing the elastic tube tightly about the uterus at the junction of the cervix and the body; the other is grasping the uterus with both hands at the region indicated, while the incision is made. The former procedure was followed by Sænger with good results; the latter has been successfully employed upon several occasions. When the uterus has been exposed, and the site of the incision determined, and when the chief assistant is ready

to check the hemorrhage either by the tubing or by his hands, the operator opens the uterus by an incision from three to four inches in length, ruptures the membranes, feels for one of the fetal limbs, and extracts the child as soon as possible. The cord should be immediately tied and cut, and the child given to a second assistant, who devotes his energies to establishing respiration. The operator should then peel off the placenta and membranes and deliver them. If the placenta and lining membranes of the uterus are found to be healthy, the uterus may be immediately closed by two rows of sutures, one through the muscular substance at intervals of not more than half an inch, the other row of sutures passing through the peritoneum. In the first, the needle should not pass through the lining membrane of the uterus if possible, but should enter the muscular substance, emerging just above the decidua. For the second, or peritoneal suture, a continuous suture of catgut may be employed if desired. When the uterus has been properly sutured, pressure made by the hand of the chief assistant or by the rubber ligature should be relaxed. If an atonic condition of the uterine muscle is present, ergot or ergotine may be given by hypodermic injection. Should this prove ineffectual, the uterus may be tamponed through the vagina with iodoform gauze. If amniotic fluid has escaped into the abdominal cavity, free irrigation with boiled water, at a temperature of 100, should be employed. The abdomen is then closed in the usual manner, a firm antiseptic dressing placed over the incision, and the patient treated in the manner usual after an abdominal section.

The placenta will often be found directly in the line of the incision. When this occurs, the operator cannot avoid incising the placenta and causing free hemorrhage. He should not, however, hesitate to incise the placenta, rapidly extract the child, and separate and deliver the placenta, when the uterus will contract and hemorrhage cease. Should the case

proceed favorably, the patient will have the usual phenomena of the lying-in period. The secretion of milk will be normally established, the involution of the uterus will proceed with very little deviation from its usual course, and no difference should be observed in the general phenomena of the patient's recovery. In two weeks the stitches may be removed from the abdominal incision, and in a month the patient may go about, wearing an abdominal bandage. The lochia are usually red in these cases, and less abundant than after normal labor. The child presents upon examination a notable absence of the configuration of the head usually seen after labor. It is different, however, in no other way from the child born naturally.

A number of cases are on record where the Cesarean operation has been performed twice, occasionally three times, upon the same patient. When the uterus is examined in such instances, no traces can be found of the former incision. If catgut be used it will have been absorbed. Silk is sometimes absorbed and sometimes encysted; silver wire, of course, remains, but so far as any difference in the uterine tissue is concerned, the union is commonly perfect.

The prognosis for the mother and child in Cesarean section, when performed as we have indicated, gives nine chances out of ten for recovery to both.

AMPUTATION OF THE PREGNANT UTERUS.—When the body of the uterus is the site of a pathological process so that its tissues when incised will not heal kindly, it is best to amputate the uterus at the cervix. Thus, in cases of fibroids, where the incision would pass through a fibroid in performing Cesarean section, necrosis and septic absorption would result if the usual Cesarean operation were employed. In cases where the pelvis is so small that embryotomy cannot be performed without great danger to the mother, if the fetus be dead, and especially if septic infection has already begun,

the uterus should be amputated. The operation is made with the precautions which have already been described as regards antisepsis. An incision is made over the uterus, and the latter is tipped forward and out of the abdominal cavity. It may then be encircled by the elastic ligature, and steel needles resembling knitting-needles be thrust through the ligature and cervix to keep the former from slipping when the uterus is amputated. The uterus should then be incised, and the child and its appendages removed. Instead of closing the womb by suture, as in the Cesarean operation, the operator then amputates the uterus just above the elastic ligature. The peritoneal covering of the uterus is then stitched over the stump, the stump is brought up to the lower end of the abdominal incision, the peritoneum is closed down to and around the stump, leaving the cut surface above the line of peritoneal suture. The abdominal incision is then closed from above downward, the stump of the uterus remaining at the lower end of the abdominal incision. If oozing from the stump persists it may be powdered with iodoform and plaster-of-Paris. If oozing be not present, iodoform should be thoroughly sprinkled upon it, and an antiseptic dressing be placed over it. The theory of the operation is that the stump of the uterus will atrophy, contract, and heal by granulation at the lower edge of the abdominal incision. This process is slower than union in the Cesarean section, and destroys any future possibility for reproduction on the part of the patient.

Various other methods for controlling the hemorrhage and ligating the stump have been employed. The stump has also been ligated, its peritoneal covering drawn over it, and it has been dropped into the abdominal cavity, but the method described has furnished the best results, and is most practicable in the greatest number of cases. The chief dangers following amputation of the uterus are hemorrhage and septic ab-

sorption. Of these, the latter can almost invariably be avoided by proper antisepsis ; the former is occasionally beyond control.

Complete removal of the uterus, by ligating the broad ligaments and dissecting the vagina from the cervix, is indicated in many of these cases. When possible, the stumps of the broad ligaments should be covered by peritoneum and the pelvic peritoneum be brought together over the upper extremity of the vagina. If gauze drainage be employed, such closure is not absolutely necessary, although desirable. This operation is longer and more difficult than amputation of the uterus, but is the more thorough and skilful proceeding.

CHAPTER XXX.

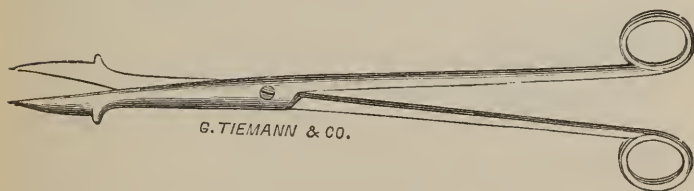
THE SURGICAL TREATMENT OF COMPLICATED LABOR.

EMBRYOTOMY.—When the fetus is so much larger than the birth-canal of the mother that it cannot be delivered without sacrificing its own life and endangering that of the mother, one of two procedures is inevitable, either to remove the fetus by the Cesarean section, or amputation of the pregnant uterus, or to deliver the fetus by lessening its size. The latter sacrifices the life of the fetus, if it be not already dead through pressure of the uterus in efforts made to deliver the child. When the fetus has already perished, the duty of the obstetrician is to deliver it through the natural channels, having previously lessened its diameters. As any procedure which makes the fetus smaller accomplishes this by cutting the child, such a procedure is termed embryotomy. Thus, embryotomy embraces piercing the head, spinal column, thorax, or abdomen, allowing the body of the child to partially collapse, thus reducing its size. Embryotomy would also include amputation of fetal members in cases where a fetus becomes impacted in a transverse position. The portion of the fetus which is most frequently pierced to lessen its size is the fetal head, and a separate name has been given to the operation of piercing the head and evacuating a portion of its contents, namely, craniotomy.

As craniotomy is the most frequent operation for lessening the size of the fetus, it may be considered first. There are practically two methods for lessening the size of the fetal head; one consists in piercing the skull with a sharp-edged instrument, allowing the brain and its fluids to escape by the

pressure of the uterus upon the head ; the other embraces the removal of a portion of the cranial bones, leaving a permanent opening into the skull, through which the brain is evacuated by the injection of fluid. The second operation is done by means of a trephine resembling that used in general surgery, but with a longer handle. The instruments employed for simply piercing the head are based upon the principle of a pair of sharp-pointed scissors having the outer edge of the blades near the tips ground to a cutting edge (Fig. 97). The scissors are introduced and the handles separated, thus causing the outer edges of the blades to enlarge the opening made by the points. The scissors may then be

FIG. 97.



SMELLIE'S SCISSORS.

turned at right angles to the direction of insertion, and the blades opened a second time, when a cross-shaped incision will result. Other more elaborate perforators are based upon the same principle as the perforating scissors.

An indication for craniotomy exists in a case where the fetus is too large for the mother's birth-canal, is presenting by the head, and has already died. In a similar case where the fetus is living, the patient and her friends must choose between symphyseotomy, a Cesarean operation, and the destruction of a living child by craniotomy. The opinion is gaining ground among the medical profession that craniotomy upon the living child is unjustifiable, and this opinion

is likely to obtain a still firmer footing as physicians become more familiar with obstetric surgery. It is always well to respect the beliefs of the parents of the child regarding religious observances, as many persons discourage craniotomy upon theological grounds.

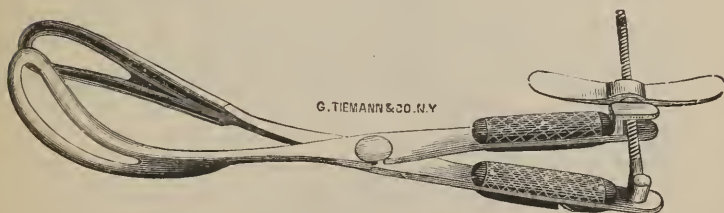
It should be borne in mind that embryotomy requires antiseptic precautions as complete and as carefully carried out as an abdominal incision. A vaginal douche of bichlorid, one to five thousand, should be given, the hands and arms of the operator should be disinfected, his instruments cleansed with boiling water and immersed in a five per cent. solution of carbolic acid or a two per cent. solution of creolin. The patient should then be anesthetized, placed across a bed or upon a table, and the operator should ascertain the exact position of the head by a thorough examination.

If it is decided to pierce the skull without making a permanent opening, the fingers of one hand should be introduced as a guide, and with the other the point of the perforator should be firmly but gently forced through the fetal skull. It is well not to enter the head in a line of suture, but to make an incision through bony tissue. The blades of the perforator should then be separated, the instrument turned at a right angle, and the blades again opened, as has been described. The case then should be left to the expulsive efforts of the mother, the expectation being that pressure of the uterus will force out the brain and its contents, and then collapse the head. Should the mother's expulsive forces fail, the forceps may sometimes be used to advantage in completing delivery. If the head be well ossified, especially at the base of the skull, the simple perforation may be followed by the use of an instrument designed to crush in the head by strong pressure, known as a cephalotribe (Fig. 98). This is nothing more than a strong pair of forceps with suitable apparatus for forcibly bringing the blades in

apposition. A better procedure, however, than incising the skull is removing a portion of bone by the trephine.

Two sorts of obstetric trephines are in use, the straight and the curved. Of these the straight trephine is the better because of its simple construction and the ease with which it can be taken apart and disinfected. By removing the screw button at the end of the trephine, the instrument can be separated into its three portions, each of which is readily cleansed (Fig. 99). In addition to the trephine, there is

FIG. 98.



LUSK'S CEPHALOTRIBE.

FIG. 99.

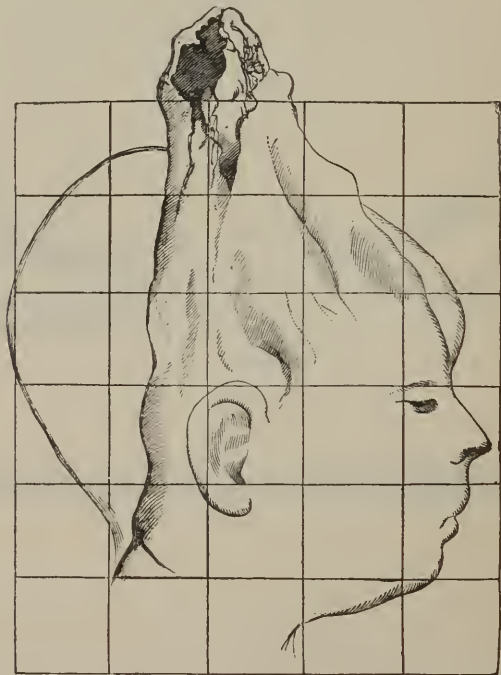


MARTIN'S STRAIGHT TREPHINE.

needed to evacuate the brain a tube of metal or hard rubber sufficiently strong to be passed freely around the interior of the skull, thus breaking up the brain and its membranes. To this tube should be attached a piece of rubber tubing through which an antiseptic solution may be injected with considerable force by a strong piston-syringe. After the head has been opened and the brain evacuated, there is required for the extraction of the head some instrument one of whose blades shall pass within the opening made by the

trephine, while the other, applied upon the external surface of the skull, fits into the first by a firm screw upon the handles, thus securing a sure grasp upon the head. This instrument has a pelvic curve like that of the forceps, and traction is made by it in the axis of the pelvis as in axis-traction for-

FIG. 100.

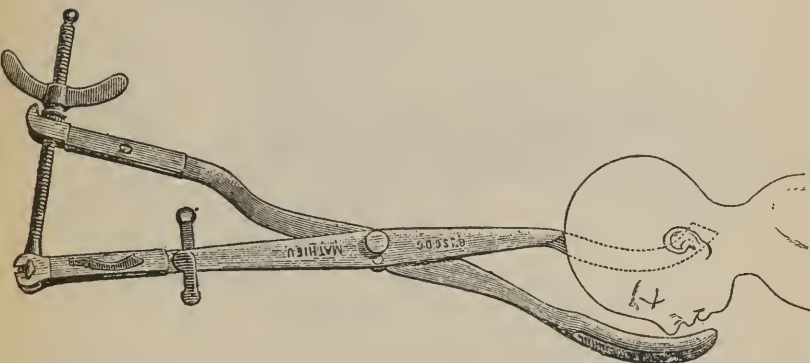


FETAL HEAD TREPHINED AND DELIVERED BY CRANIOCLAST.

ceps. As the head descends, pressure of the walls of the pelvis collapses the head, and it emerges drawn out in a shape somewhat resembling a sugar-loaf (Fig. 100). The procedure of extracting the head and collapsing it in this

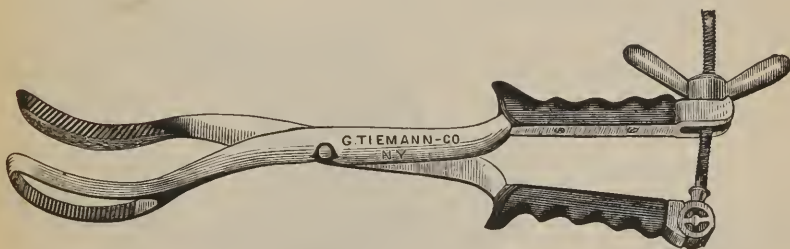
manner is known as Cranioclastis, and an instrument designed for this purpose is called a Cranioclast (Fig. 101). The instrument will be better understood by reference to

FIG. 101.



GRASPING THE HEAD WITH THE CRANIOCLAST.

FIG. 102.

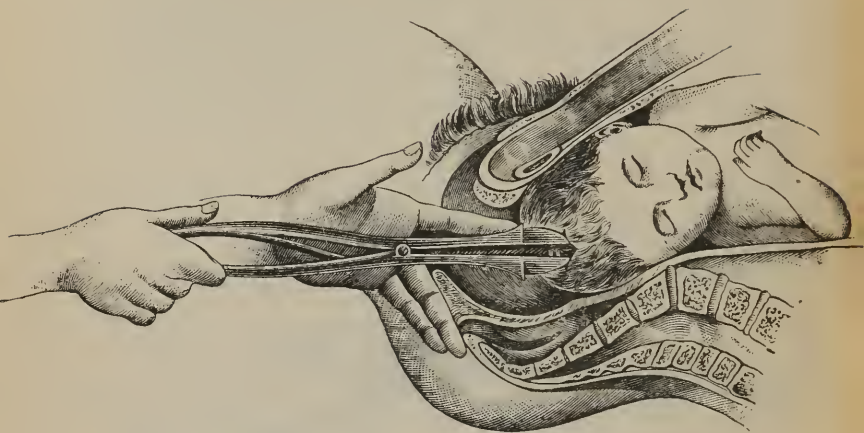


BRAUN'S CRANIOCLAST.

(Fig. 102), which represents the Cranioclast devised by Carl Braun of Vienna.

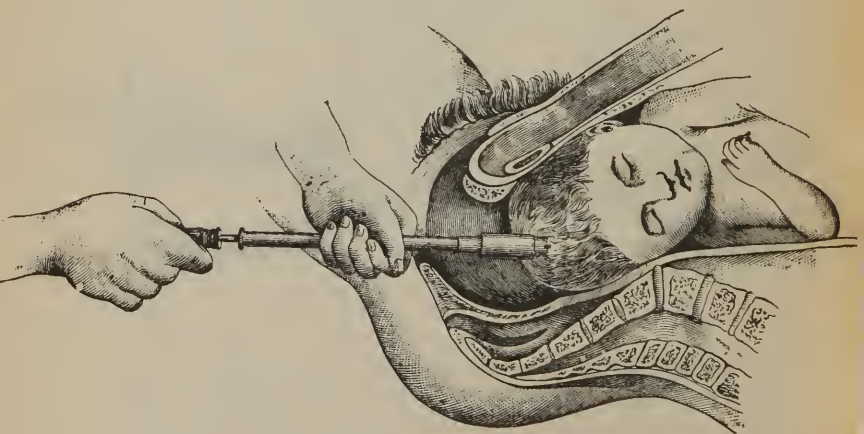
To contrast the two methods of lessening the size of the head we may repeat that the skull may be entered by an

FIG. 103.



CRANIOTOMY WITH THE SIMPLE PERFORATOR.

FIG. 104.



CRANIOTOMY WITH THE TREPHINE.

incision through the bone with a perforator. A pair of strong compressing forceps, with a compressing screw at the extremity of the handles, may then be employed to crush the head and extract it. This is known as Cephalotripsy, and the compressing forceps is named a Cephalotribe.

On the other hand, the skull may be trephined and the brain evacuated, and an instrument employed to make traction, one blade of which is inserted through the trephine opening, the other grasping the head externally, while compression is made by a strong compressing screw. Traction in the axis of the pelvis results in the collapse of the head through pressure of the pelvic walls. This is Cranioclastis, and the instrument is a Cranioclast.

In cases where twins have become impacted in the uterus, and one or both have perished before assistance arrives, it may be necessary to decapitate the child already partially born, to relieve the mother. In cases of transverse presentation, where the uterus is in a condition of rigid contraction known as uterine tetanus, it may not be safe to attempt to make version, because of the danger of uterine rupture. There remains, then, nothing to do but to decapitate the fetus and remove the body and head separately.

In transverse positions, amputation of the head may be performed by passing a heavy cord about the neck and, by a sawing motion, cutting slowly through the tissues (Fig. 105). When the child's spinal column is reached, if the cord be guided to the intervertebral cartilage, decapitation may be accomplished without especial difficulty. Should the cartilage not be readily found, a cutting instrument may then be employed to finish the decapitation. A very convenient and safe instrument for this procedure is the hook devised by Carl Braun (Fig. 106). This hook is passed over the child's neck, drawn strongly downward, and a rotary movement from side to side kept up until finally the tissues are completely severed.

It is best to employ, if possible, some instrument or device having no sharp cutting edge, as the danger of wounding the soft tissues of the mother is great. Braun's hook is carefully polished, and presents no edge which should injure the

FIG. 105.



DECAPITATION; TIGHTENING A CORD AROUND THE NECK.

maternal tissues (Fig. 106). In cases of impacted fetus, where the body of the child is already born, decapitation may be accomplished by the use of a pair of ordinary strong scissors and a piece of rubber tubing. The tubing should be passed

about the neck and tied, forming a circle around the child's neck. Its purpose is to serve as a guard against cutting too high

FIG. 106.

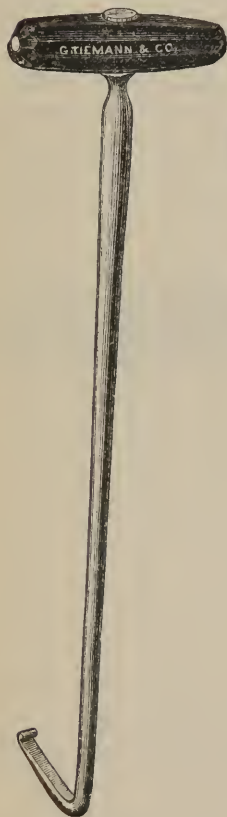
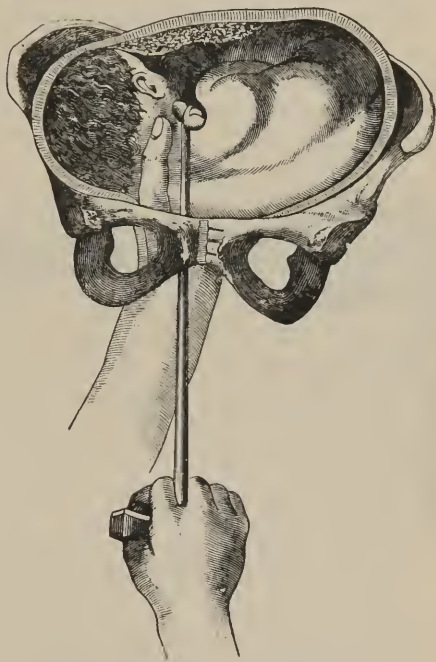


FIG. 107.



DECAPITATION WITH BRAUN'S HOOK.

BRAUN'S DECAPITATION
HOOK.

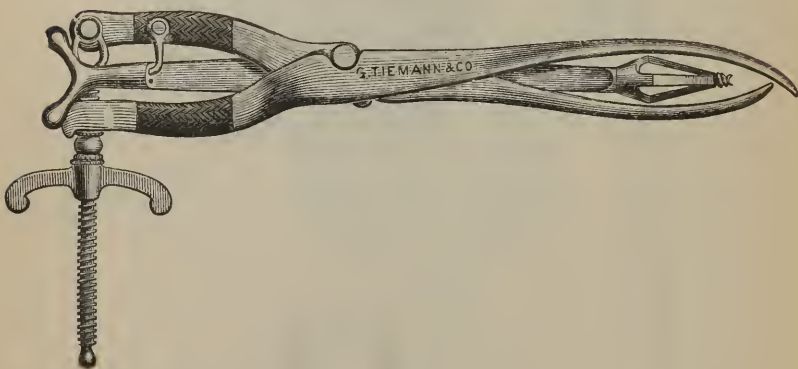
and injuring the tissues of the mother. Guiding the scissors with the left hand, with the right hand the tissues are severed

just beneath the constricting tube, and thus decapitation is accomplished.

Ingenious instruments have been devised by which a cutting edge, in the form of an *écraseur* or cutting wire, may be passed about the head, but such instruments are more complicated and less safe than the simple devices described.

In cases of hydrocephalus, when the child presents by the breech, the progress of birth will often cease with the efforts to expel the head. It is desirable in such cases to drain the subarachnoid spaces to lessen the size of the head ; an opening

FIG. 108.



TARNIER'S BASIOTRIBE.

may be made into the spinal column, the soft tissues having first been incised to permit of easy access to the vertebræ.

By evisceration is understood that form of embryotomy which opens the abdominal or thoracic cavity of the fetus, allowing the escape of blood and other fluids contained in these cavities, and oftentimes the removal of the viscera themselves. This is usually readily accomplished by incising the walls of the cavity. It is sometimes best to eviscerate the thorax by opening the abdomen below the diaphragm,

rupturing the diaphragm, and extracting the lungs and heart from the opening thus made.

Embryotomy requires especial caution as regards antisepsis. It is well not only to cleanse instruments and hands, but also to wash out a cavity opened by an antiseptic solution. In cases where the fetus has died it may contain in its body sources of infection, and hence its tissues should be antiseptized at the moment when the body is opened.

Craniotomy upon the after-coming head is sometimes indicated in cases where the head becomes impacted at the moment of delivery in breech presentation (Fig. 109). It is usually most convenient to enter the skull through the *foramen magnum*, the head having been brought as far down as possible by traction upon the trunk. After the evacuation of the skull, delivery will be usually accomplished most easily by the use of the cephalotribe. It may sometimes be necessary to enter the skull through the roof of the fetal mouth.

MINOR OBSTETRIC SURGERY IN DELAYED LABOR.—In cases where delay in labor occurs through rigidity of the os and cervix, dilation may be accomplished by stretching with the fingers or Barnes' rubber bags, or by making multiple shallow incisions in the os and then dilating. Especial precautions regarding antisepsis are required in these cases, for wounded surfaces in the os and cervix become easily infected. By multiple incisions extensive laceration of the cervix may often be prevented.

It is well to give the patient in such cases frequent hot douches of creolin, teaspoonful to quart, or hot water alone. Softening of the tissue is promoted and asepsis maintained.

CHAPTER XXXI.

SYMPHYSEOTOMY.

By symphyseotomy is understood severing the symphysis pubes. Pubeotomy means severing any portion of the pubic bones, one or both of the rami being usually selected for this operation.

The indications for symphyseotomy are best understood when we consider what changes in the shape of the pelvis result when the joint is severed. It has been found by experiment that when a patient is put upon the back and the thighs separated, if the joint be severed the two halves separate 4 cm., or $1\frac{1}{2}$ inches; the two halves of the pelvis rotate outward and downward, the antero-posterior diameter of the pelvic brim is increased $\frac{6.5}{100}$ cm., or $\frac{1}{4}$ inch; the transverse diameter is increased 2 cm., or $\frac{3}{4}$ of an inch, and the obliques are made larger, $1\frac{7.5}{100}$ cm., or $\frac{3}{5}$ of an inch. In general terms we may represent the increase in the antero-posterior diameter of the pelvic brim after symphyseotomy as one; in the transverse as three; in the obliques by two; these ratios persisting when the separation of the joint surfaces is increased by adduction of the thighs. When the pubes is drawn asunder 9 cm. ($3\frac{1}{2}$ inches) the sacro-iliac joints yield, the right showing a separation of $1\frac{1}{2}$ cm., or $\frac{3}{5}$ of an inch. Experiment and clinical observation show that the two halves of the symphysis close after section with union which is usually complete; occasionally slight mobility has persisted in the joint, but not to a degree to disable the patient.

From what has been stated, it is evident that symphyseotomy is indicated in moderately contracted pelves. The operation is not indicated in pelves whose antero-posterior diameter is less than 6.5 cm., or $2\frac{1}{2}$ inches. The patient should be free from septic infection; the pelvis must not be ankylosed or extremely contracted in its oblique diameters; the fetal heart sounds must be good. The operation is easier in multiparæ than primiparæ, and also when the soft parts are dilated.

To perform the operation the bladder and rectum must be emptied. The mons Veneris should be shaved, and the external genitals and birth canal thoroughly cleansed with hot water and soap and bichlorid of mercury solution, 1 to 1000. The patient should be anesthetized to surgical anesthesia, and placed on her back upon a firm bed or table, her thighs together. A scalpel, hemostatic forceps, curved, probe-pointed bistoury, strong silk suture, needles and needle forceps, catgut, iodoform gauze, scissors, and axis-traction obstetric forceps should be in readiness. Rubber adhesive plaster and firm bandage material are also needed. An incision in the median line above the joint is made sufficiently long to give free access to the joint. Occasionally veins are met with requiring ligation. The finger of one hand is then passed down behind the joint as a guide; to assist in recognizing the joint it will be remembered that two small tubercles or projections are situated on each side of the joint at its upper extremity. The joint is often not in the median line. The bistoury is then passed from above and behind to below and forward. The subpubic ligament should not be divided if it can be avoided. After severing the joint the wound should be tamponed with gauze. The patient is then brought to the edge of the bed or table, the thighs kept extended if possible, while pressure is made on each side of the pelvis at the trochanter and iliac crests by assistants. Delivery is then

effected by the forceps or version. After the fetus and its appendages have been removed, strong silk sutures are passed through the skin and fascia over the pubes, pressure on the sides of the pelvis being kept up by assistants. Broad strips of adhesive plaster are then passed around the pelvis over the trochanters, the supra-pubic wound being covered with antiseptic gauze. A broad canvas belt with buckles is very convenient, and can be readily applied over the dressings. The wider portion of Esmarch's bandage has been used.

In uncomplicated cases union occurs in the severed tissue by first intention. When suppuration is detected, a portion of the wound should be reopened and drainage and disinfection carried out. In extracting the child it is well to bear in mind that the birth canal becomes oval transversely at its inferior strait after symphyseotomy. Injury to the soft parts by improperly directed traction may thus be avoided.

The direct maternal mortality and morbidity of symphyseotomy is small, from 3 to 5 per cent. being a liberal estimate of mortality. Fetal mortality and morbidity are far less than in difficult labors in contracted pelvis without the operation.

In highly contracted pelvis pubeotomy, severing the rami of the pubes, has been performed. A saw has been found useful in these cases, and also in the rare instances in which the symphysis is found ossified as the result of the deposit of pathological products in the joint.

The puerperal period after symphyseotomy is usually normal. The patient requires faithful care and strict cleanliness, and her continued recumbent posture makes her liable to bedsores. From four to six weeks will usually elapse before she can sit up or move freely about.

CHAPTER XXXII.

THE PUERPERAL STATE.

The accomplishment of labor marks the beginning of what is known as the lying-in period, or *puerperium*, or the puerperal state. By this is understood the time in which the woman is recovering from the effects of her labor. It will be seen that no limit can be set in all cases for the puerperal period. Thus, the savage woman recovers from labor sufficiently to resume her usual avocations in a few days, while her civilized but weaker sister requires several months to fully recover from parturition. The lying-in period applies especially to the time during which the patient is in bed, but also the time elapsing before the patient engages actively in her former pursuits. The phenomena of the puerperal period are those connected with the process by which the uterus and the entire genital tract are reduced in size from their hypertrophied condition at labor to their normal proportions. Together with this process, called *involution*, the abdominal muscles of the patient, which have been strained and distended during the pregnancy, assume their former consistence and contractile power. The hypertrophies which have existed in the secretory and glandular organs of the patient gradually give place to the usual conditions obtaining in these parts. Together with these changes, which may be styled retrograde or absorptive changes, there occurs the establishment of a new function, namely, lactation, or the secretion of milk.

It is evident that the first set of changes mentioned, namely, *involution*, results in the formation of a large amount of material to be removed from the body. If organs have hy-

pertrophied by the multiplication of cellular elements and the aggregation of tissues, a normal condition of these organs can only be reached by eliminating the excess of material. Thus the uterine muscles and the enlarged glands of the lining membrane of the uterus are lessened in size by a process closely resembling that of fatty degeneration. The material produced by this degeneration is, a portion of it, oxygenated in the patient's blood by respiration, while the greater part of it is removed from the body by the different emunctories. The presence in the blood of this fatty material produces an increased amount of bodily heat, resulting oftentimes in a slight and habitual rise of temperature during the first week or ten days of the puerperal period. Thus, the average temperature of the healthy lying-in woman is often one hundred degrees instead of ninety-eight and five-tenths. In some cases, the patient seems to take care of this material without disturbance of temperature and with, possibly, a different mode of elimination. Together with the breaking down of hypertrophied tissue there comes a process of multiplication of red blood corpuscles which restores to the blood its losses at labor.

When once the fatigue of labor has been surmounted, a sense of physical comfort and an increase in appetite commonly occur, which persist through the puerperal period. The lacerations in the genital tract heal during this time; deposits of pigment upon the face or other portions of the body are slowly absorbed and destroyed, and oftentimes a gain in weight and an increase in the development of the woman follow parturition. While the breasts have become somewhat hypertrophied by a turgid condition of the mammary glands during pregnancy, yet the formation of breast-milk does not take place until a number of hours, or possibly two or three days, after delivery. The milk may then come into the breasts, as it is sometimes said, "with a

rush." The breasts become distended, reddened from a general hyperemia, and frequently the neighboring lymphatics show a temporary engorgement. The over-distended tissues of the perineum and pelvic floor regain their elasticity to a considerable extent. There always remains, however, a certain degree of dilatation—sufficient to make a diagnosis of a previous parturition possible.

A peculiar condition of receptivity to certain infections seems to obtain during the lying-in period. Thus, the exanthematous diseases are more easily contracted by lying-in women than by others. Septic infection from polluted air, or from unclean surroundings, is also readily absorbed. While this may be explained in part by the lacerated surfaces of the genital tract, infection from a contaminated atmosphere is sufficiently common to illustrate the patient's receptive condition. The nervous system, which has been so severely taxed during parturition, shows immediately afterward an unstable state which renders the patient easily disturbed by emotion. Thus any cerebral disturbance results in a considerable derangement of temperature, or, oftentimes, in serious interference with the function of lactation.

The treatment of the puerperal period consists in surrounding the patient with such an environment that the dangers of infection shall be reduced to a minimum, and that the processes of absorption and repair be disturbed as little as possible and furthered in every way. Tranquility and rest for the nervous system are also of paramount importance. To secure proper protection against infection for the lying-in patient, her room should be clean and not connected with any channel leading to decomposing material. Thus, it is better that there be in her apartment no pipe leading to a cesspool, drain or sewer. Occasionally, heating apparatus may become a source of danger, as illustrated in a hospital where a nurse had carelessly thrown a napkin, stained with

the lochial discharge, into an unused furnace ; a flue from the furnace opened near the bed of a patient recently confined, who contracted septic infection from air conveyed through the flue from the furnace below. More frequently, however, the immediate environment of the patient may become a source of safety or of danger. Thus, her bed and bedding should be absolutely clean ; the effete material removed from her body by the intestines and kidneys should be promptly disposed of, and the lochial discharge should be absorbed in such a manner as to prevent its decomposition. The air which the patient breathes should be pure, fresh, and frequently renewed. Processes of excretion and involution are best furthered by promoting the action of the excretory organs, and by favoring nutrition in every possible way. Thus, it is an excellent custom to secure a thorough evacuation of the intestines on the second or third day after labor, and the bowels should move at least once in two days through the lying-in period. The action of the kidneys should be encouraged by water freely taken. The skin should be stimulated to perform its function by a daily bath, followed by gentle massage. The nervous system of the patient should be afforded rest by securing absolute freedom from intrusion.

As regards the absorption of the lochia and the prevention of absorption by wounded surfaces of the genital tract, antiseptics are indicated. It has formerly been customary to receive the lochial discharge upon napkins, which were cleansed when soiled, and used again. As our knowledge of antiseptics has increased, this practice has, so far as possible, been superseded by the use of absorptive dressings, which are destroyed when soiled. These dressings have the further use of occluding the genital canal, and preventing the entrance of infectious germs from the outside. Among the many occlusion and absorptive dressings employed may be mentioned sublimated jute enclosed in cheese-cloth soaked in sublimated solution ;

old, soft linen, antisepticized in the same manner, and made into absorptive pads, and, in the experience of the writer, a pad or napkin made as follows : first, a strip of picked oakum or jute three-fourths of an inch thick, sixteen inches long, five inches wide. On each side of this, cheap cotton batting, sufficient to cover and inclose the oakum. The whole is included in a piece of cheese-cloth, eighteen inches long, twelve or thirteen wide. The edges of the cheese-cloth are brought together and secured loosely by cotton thread. The ends may be closed to advantage in the same manner. This napkin is dipped in bichlorid of mercury, one to two thousand, and dried.

On an average, six or eight are required for the first three or four days after confinement, and subsequently four daily. When the material is bought in large quantities at wholesale, and these napkins are made by hospital nurses, the material itself, exclusive of the labor and the bichloride of mercury used, costs one and one-quarter cents for each napkin. When a small quantity are made—less than a hundred—the napkins cost, also excluding labor and bichlorid, about three cents each. When stained through, the pad is removed, rolled up in a bit of old paper, and burned.

The question as to the possibility of a patient infecting herself with puerperal sepsis from the secretions or discharges of her own body has occasioned much discussion. If auto-infection be possible, then the lochial discharge is extremely dangerous to the patient, and should be thoroughly antisepticized. If, on the other hand, the lochial discharge is dangerous only after it has come in contact with the external atmosphere and undergone a partial decomposition, then the lochial discharge does not need to be antisepticized except after it has emerged from the body into the external atmosphere. If an examination of the genital tract of the mother be made after

labor to determine presence or absence of septic bacteria in her lochial discharge, it will be found that only where the lochia come in contact with the atmosphere do septic germs exist. In the lower portion of the vagina are found the lower orders of bacterial life. The interior of the uterus in a normal case contains no septic germs whatever, and hence requires no disinfection. The routine use, then, of vaginal douches after labor is quite unnecessary, and often harmful, because of the risk of infection which occurs whenever the human body is entered by any instrument or appliance. Practically, then, when a patient has not been infected before labor by syphilis, gonorrhea, or septic infection, she needs after labor but a single vaginal douche. This should be given of bichlorid of mercury one to five thousand. After this no douches are needed, but the parts should be bathed with the same solution after the renewal of each pad, and especially after the bladder and rectum are emptied. It is well, in all cases where specific, septic or catarrhal inflammation of the genital tract has occurred before labor, to give the patient a preliminary douche of some antiseptic when labor begins. Bichlorid of mercury one to five thousand is often employed. A preparation of green soap and creolin, so combined as to contain from one to two per cent. of creolin, has been used at my suggestion in the Philadelphia Hospital for several years with advantage. The soap is especially efficient in removing retained and partly decomposed secretions.

Especial precautions are necessary whenever occasion arises for catheterizing the patient. The catheter should be kept in a five per cent. solution of carbolic acid, or a one to one thousand solution of bichlorid of mercury. Before its introduction the attendant should carefully cleanse the orifice of the meatus with a bichlorid solution of one to five thousand. The catheter should then be inserted without coming in contact

with the patient's bedding or surrounding portions of her body. After the bladder has been emptied, the parts should again be cleansed in the same way as before the insertion of the catheter. With these precautions it is possible to avoid infection of the bladder, although, without them, such infection and consequent inflammation are very apt to occur.

CHAPTER XXXIII.

THE PUERPERAL STATE—LACTATION.

The breasts of the mother also require attention during the lying-in period to prevent the entrance of germs and the development of mammary abscesses. During the latter months of pregnancy the patient should have washed the nipples thoroughly with Castile soap and warm water, and if any cracks or abrasions exist, an ointment of boracic acid, ten grains to the ounce of some suitable fat, should be employed. At the time of labor it is well to prevent congestion and overdistention of the breast, and also to take precautions that some of the lower forms of bacteria, which easily infest the child's mouth, should not form upon the nipple. The breasts may be advantageously supported and compressed by several forms of breast bandages. Thus a broad figure of 8 may be passed around the breasts and over the shoulders. A breast-binder may be used which, in the experience of the writer, has never occasioned inconvenience, and usually proves a considerable comfort. This should be fitted by the nurse at the time when the breasts become distended. A strip of unbleached muslin or Canton flannel should be selected, large enough to encircle the body, lapping over between the breasts, and wide enough to go over the axillary line to the extremity of the sternum. This may then be pinned about the patient, the line of pinning being in the center of the body between the breasts. Opposite to the nipples two holes may be cut the size of a silver quarter of a dollar, and these apertures should be bound with strong tape, otherwise the weight of the breast will force the gland through the bandage, tearing it

asunder. An aperture of this size will ordinarily enable an infant to nurse without removing the bandage ; but should it be desired to enlarge the aperture, this may be done to any extent required. Some prefer the breast-binder without holes for the nipples, unpinning the bandage to nurse. Shoulder-straps are then fitted, being fastened anteriorly to the upper edge of the bandage, passing over the shoulder to the upper edge of the bandage upon the other side and behind. By tightening or loosening the shoulder-straps the breasts may be gathered toward the median line, and raised toward the upper portion of the body. In this way the patient will experience a marked degree of comfort, and over-distention and threatened engorgement may be prevented. Infection of the nipple and of the breasts may be guarded against by cleansing the nipple thoroughly after each nursing with a saturated solution of boracic acid, to which a little glycerin has been added. Should cracks or fissures occur, they may be painted, after being cleansed, with compound tincture of benzoin.

It will be found advantageous to take precautions to avoid the growth of bacteria in the mouth of the child. While septic bacteria do not often gain access to the child's mouth, yet some of the lower forms of these germs are very commonly found there, and may infect the mother's nipple. It is well to cleanse the child's mouth, after nursing, with a bit of soft old linen, dipped in a saturated solution of boracic acid, to which a little glycerin has been added. The breasts should be nursed, so far as possible, in alternation. During the day two hours is a convenient interval for the child to nurse, and during the night, twice between ten in the evening and six in the morning is quite sufficient. If the nurse insists upon the child's feeding regularly through the day, even waking it if necessary, it will be more likely to sleep at night, and will be well able to do with less frequent nursing. No absolute rule can be laid down regarding the amount which any child

should take. The child's appetite, if it be properly taken care of, is usually the best guide. When a child nurses with great greediness, some abnormality in digestion should be suspected, and sought for, if possible. Such children are very apt to regurgitate very frequently after nursing, and are often troubled with indigestion and flatulence. The habit of greedy nursing may sometimes be corrected if the mother will allow the nipple to rest between two fingers of the hand which is supporting the breast. Pressure upon the nipple in this manner will regulate the flow of milk, and prevent too large an amount from entering the child's stomach at once. On the other hand, a tardy secretion of milk may occasion some anxiety for fear lest the infant suffer. If the usual preliminary flow of colostrum is present, but little uneasiness should be felt, although the discharge from the breast remains thin. If the infant cries from hunger which cannot be appeased, one or two meals of sterilized milk may be given during the twenty-four hours.

It not infrequently happens that some abnormal condition of the mother's milk exists, which causes it to disagree with the infant. A gross inspection of such milk would result in finding it thinner than normal, and bearing the appearances of a fluid deficient in the amount of fat. An accurate idea of the composition of such milk can only be obtained by subjecting it to an examination with a lactometer, and also to microscopic examination. As the physician cannot always have a lactometer at his disposal, he will do well to rely largely upon his microscope. Normal milk, when viewed under the microscope, presents a number of rounded bodies which are the milk globules. They are of fairly uniform size, and are smooth and not granular in appearance. In the first milk or colostrum which forms, there are found numerous young epithelial cells, which are derived from the gland tubules of the breast. As the secretion of milk becomes established,

these colostrum corpuscles, as they are often called, disappear, and in their place the field of the microscope is found to contain the rounded, smooth, corpuscular body which forms the essential element in milk. The fully developed milk-globule is a cell composed of an albuminoid outer wall or envelope, containing a small amount of fat. When digestion occurs, the albuminoid envelope is digested and dissolved, and the fat is directly absorbed in the lacteals. If a microscopic examination be made of the stomach of an animal digesting milk, the fat of the milk may be observed in a state of granular degeneration in the tubules of the stomach and intestines. It is then undergoing the process of absorption. If the physician, upon examining a sample of milk, finds many colostrum corpuscles present, and that the number of milk-globules is deficient; that they are not of a fairly uniform size, and seem not to be present in abundance in the field, he may reasonably infer that the milk is deficient in quality. If, furthermore, he should observe blood-corpuscles, pus-cells, and bacteria in the milk, he should at once reject it for use, as being infected with some form of puerperal infection. Should the mother be suffering from tuberculosis of the breast, the tubercle bacilli can be detected in the milk.

Much discussion has been aroused regarding the influence of the mother's diet upon the secretion and quality of her milk. It has been a common practice to interdict such articles of food as are supposed to "sour" the milk. Such, for example, are acids and food cooked or dressed with an acid. Salad and pickles were considered as highly objectionable food for a nursing mother. Further studies on the mother's digestion have shown that whatever agrees with her personally, and whatever is digested well, as a rule produces milk for her child. The food of the nursing mother should be easily digested, abundant in quantity, palatable, and, if possible, enjoyable. Certain articles of food tend to increase materially the flow of milk; such are milk itself when taken freely by the mother;

beets, vegetables containing sugar ; chocolate and cocoa are beverages tending to increase the secretion of milk. Beer and porter, in many cases, and water, are also beverages of practical value.

Patients differ greatly in regard to the perfect performance of the function of lactation. Drugs given to promote the secretion and flow of milk are useful only as they are general tonics. There is no specific of practical and continued value in these cases. The care of the breasts during the period when lactation is about to be established is a matter of considerable importance. Not only should the nipple be kept thoroughly cleansed, as has been described, but the settling and accumulation of milk in any portion of the breast should be prevented by gentle friction and massage over those portions of the gland where the milk-ducts are distended and hardened. More important, however, is the use of the bandage as has been described.

Certain drugs are excreted very rapidly through the mother's milk, such as potassium iodid, the iodids, chlorids and certain drugs affecting the central nervous system profoundly. It has been supposed that opium, when taken by the mother, passed soon into the milk, and thence to the child. While this is undoubtedly partially true, yet there is reason to believe that it passes less readily into the milk than has been supposed. Quinin, when given to the mother, affects the child through the milk, and many purgative medicines have the same effect.

If the flow of milk be excessive or the death of the child occurs, the secretion can best be stopped by applying lead water and laudanum or belladonna on surgeon's lint, bandaging the breasts as tightly as can be borne, and purging freely with salines.

When the breasts are hot and throbbing, cold applications are indicated ; where great hardness and pain are present, heat may be applied. A breast pump is useful to exhaust the milk slightly, and thus relieve distention.

CHAPTER XXXIV.

ARTIFICIAL FEEDING OF INFANTS.

It not infrequently happens that the function of lactation fails ; this may arise from deficient vigor on the part of the mother without any one local or specific disease. It also follows the acute infections of whatever sort, of which septic infection is the most familiar example. Malformation of the breasts and occlusion of the ducts of the nipple are also causes. A sudden and severe shock to the nervous system of the mother may produce cessation of lactation. This function may be artificially suspended in cases where the child is still-born, or where it is necessary to separate mother and child immediately after birth. There are, again, certain causes which contraindicate lactation, although the function may become established ; such are, a manifest lack of strength on the part of the mother, even although no well-defined disease be present ; thus, a woman may have been observed to fail in health while nursing a child, this failure being more pronounced after each successive pregnancy ; a woman suffering from tuberculosis, syphilis, cancer, or any other pronounced infection, should not nurse her infant. A curious exception to this rule is sometimes observed in women suffering from scarlatina ; cases are on record where such patients have nursed their infants without injury to the latter. It is sometimes necessary to suspend nursing in the interest of the mother because of its exhausting effect upon her.

In the interest of the child, again, it may be necessary to supplement mother's milk by some artificial food, or to suspend lactation entirely, or to feed the child wholly upon some

source of nutrition other than the mother's milk. In the interest of the child when its mother cannot nourish it, a substitute or wet-nurse is most desirable. The selection of a wet-nurse should always devolve upon the physician, and is to be made in the most careful manner ; such a woman should be as nearly as possible of the same age as the mother, and her infant should also correspond in age to the one which she intends to feed. The physician will carefully examine the proposed wet-nurse for any evidence of syphilis, tuberculosis, or septic infection. The condition of her digestive organs must also be ascertained, as well as any taint from alcoholism or other objectionable habit. Women of a placid disposition, good constitution and simple, regular habits, are best fitted for this duty. There can be no objection to examining the milk of such a woman microscopically or chemically, but a convenient practical test is found in the condition of her own child ; if that is healthy and well-nourished, it is but reasonable to expect that another child fed by her should be in similar condition. The breasts should also be examined to see that they are well formed, and that the nipples are not sore nor likely to become so. A not uncommon mistake in the treatment of wet-nurses is the radical change in their habits and style of living which is brought about by the zealous but unwise anxiety of parents to feed them well ; women accustomed to frugal habits of living, active work and long hours of sleep, if confined to a house, fed upon rich and indigestible food, and disturbed at night to nurse too frequently a fretful child, cannot remain long in good health, nor will their milk afford proper nourishment for an infant. Care should also be taken that the wet-nurse be subjected to as few mental and nervous disturbances as possible. Since a better knowledge of infant feeding is beginning to prevail, the employment of wet-nurses is not so general as formerly. Physicians appreciate that it is no inconsiderable risk to take a stranger from a hospital

to serve as wet-nurse, and many prefer to prepare foods in a well-known and accurate manner rather than to trust to nourishment derived from a woman of comparatively unknown antecedents.

The most natural substitute for mother's milk is that of the cow ; while it occasionally happens that nothing but goat's milk will agree with the child, yet in the majority of cases cow's milk may be so modified as to fulfill the indications. It is essential that this milk be produced under circumstances favorable to its purity, and be conveyed to the consumer as promptly as possible, and in as pure a condition as possible. Observation has shown that finely bred cattle are often subject to tubercular disease, and that tubercular infection can be conveyed to an infant through cow's milk ; hence the average cow of fair breed is preferred rather than the highly bred animal ; it is sometimes observed that the milk of one cow agrees better with an infant than the milk of another cow of the same kind, and living under the same circumstances.

By sterilization of milk we understand such a process as shall destroy noxious bacteria and thus render milk a safe food. Numerous researches have been made in this matter, but experience points at the present time to the following as the best method of preparation. Milk should be allowed to stand for a little time in order that any impurities which will gravitate to the bottom may have an opportunity to settle ; there is no objection, further, to skimming the milk lightly, not removing, however, the greater portion of the cream. Milk should be sterilized, if possible, in the bottle from which the child will nurse, and a sufficient number of bottles should be provided so that sterilization may be conveniently performed once in twenty-four hours ; the milk should first be rendered slightly alkaline in reaction, by the addition of lime-water in the proportion of half ounce for an eight ounce mixture ; it should then be poured into the bottle,

a funnel having been used so that the neck of the bottle does not become wet. In each eight ounces for a new-born child the proportions may be as follows: Cream, ounces, $1\frac{1}{2}$; milk, ounce, 1; lime-water, ounce, $\frac{1}{2}$; sugar of milk, 1 teaspoonful; water to make 8 ounces; the bottle should then be corked with cotton-wool or cotton batting, which has been previously baked in the oven until it is brown; the bottle should then be placed in a pan containing about three inches of water and placed upon the fire, and allowed to heat to a temperature of 155° F. for six minutes. If the milk must be kept longer than twenty-four hours it should be allowed to come to the boiling point for one or two minutes; the bottles should then be removed from the fire and allowed to cool, and kept upon ice or in a cool place until they are required. When it is time for the child to nurse, the bottle should be placed in a basin containing a few inches of water, put upon the fire and warmed to a blood heat, 98° F.; the cotton cork is then removed and a plain black rubber nipple, which has been previously cleansed in a saturated solution of boracic acid, should be placed upon the bottle and the child allowed to nurse.

It will be noticed that this formula calls for a very dilute mixture, adapted for a newborn infant; as the child grows older the amount of water in the mixture is decreased, the relative amount of milk and cream remaining the same, while both are increased. In regard to the amount to be given to the child at each feeding, each infant is a law unto himself; the common mistake is in over-feeding, and hence it is better to begin with three ounces every two or three hours during the day, and four ounces taken twice during the night. The bottle ought not to be given to the child and left without supervision to nurse, but its nursing should be watched, and then an intelligent idea of its appetite and needs can be obtained. The child should not be allowed to lie with the

bottle beside it, the nipple in its mouth ; it should feed until it is done, and then the bottle should be taken away.

Digestive ferments are often employed to advantage with infants. Milk may be peptonized, then sterilized, as has been described, or pepsin and pancreatin may be given just before feeding ; cod-liver oil is a most useful aid in promoting the infant's nutrition, and olive oil will be often taken with avidity and benefit.

It is quite evident that precautions taken to secure cleanliness in dairies are more important than any method of preparing milk subsequently ; hence the milch cows should be kept perfectly clean, the hide curried as carefully as that of a horse, the floor of the stable kept as clean as possible, and before milking care taken that the udder and teats of the animal and the hands of the milker should also be clean. It is sometimes well to milk directly into glass jars which have been previously scalded, and which may be sealed hermetically until received by the consumers ; before shipment milk should be kept in a clean, cool place, especially free from the presence of rotting vegetable or animal matter, as it has been shown that poisonous elements may be developed in milk in unfavorable surroundings.

It will sometimes be observed that obstinate constipation in infants follows the use of sterilized, scalded or boiled milk ; this results from a change in the albuminoid bodies in the milk, and can usually be counteracted by diluting the milk with oatmeal water, instead of the water otherwise employed ; while if diarrhea is present with acute dyspepsia, barley-water may be substituted for oatmeal-water ; it is well to avoid the use of cane sugar, as fermentation happens more readily in mixtures containing cane than in those sweetened with milk-sugar ; in using milk sugar care should be taken that it is of the best quality, as it sometimes, when impure, causes indigestion.

When a sudden attack of acute enteritis comes on, there is no question of the wisdom of stopping milk at once; the child can be well supported by whisky and water, or brandy and water, and by the white of a raw egg mixed with water and slightly sweetened; by carefully made chicken or mutton broths, or by arrowroot or barley gruels. As infancy advances, it will be found advantageous to combine with cow's milk some of the prepared foods offered in market; the essential constituents of these foods are usually diastase or starch, or some albuminoid derived from grain. With healthy children in the country, bread and milk, mashed potatoes carefully prepared, broths, soups and soft-boiled eggs usually furnish a proper transition from a diet of milk to the mixed diet of childhood.

CHAPTER XXXV.

ABNORMAL INSERTION OF THE PLACENTA, PLACENTA PRÆVIA.

The usual location of the placenta is upon the anterior or posterior uterine wall, above the level of the lower uterine segment ; in multiparæ, especially those who have suffered from endometritis, atrophy of the villous tissue in the placental decidua, and placental development in the decidua reflexa, result in failure of the placenta to adhere to its customary location. In the upper two-thirds of the uterus the distended and relaxed condition commonly found in multiparæ also favors the location of the placenta in the lower uterine segment or cervix.

Placenta Prævia may be of four varieties : central (placenta prævia centralis), partial (placenta prævia partialis), marginal (placenta prævia marginalis), lateral (placenta prævia lateralis). The first and most dangerous form is that in which the placenta is directly over the mouth of the uterus, between the child and the external world ; a diagnosis of this condition is made by the hemorrhage which is inevitable so soon as dilatation of the os begins. Upon examination, instead of finding the membranes, the examiner comes upon a fleshy mass which is easily distinguished as the placenta ; bleeding in these cases is severe, often fatal. It is impossible for the physician to find any portion of the mouth of the womb not filled up by the placenta,

In partial placenta prævia, when a portion of the mouth of the womb is covered by the placenta, there can be distinguished at one side a vacant space where the membranes may be felt.

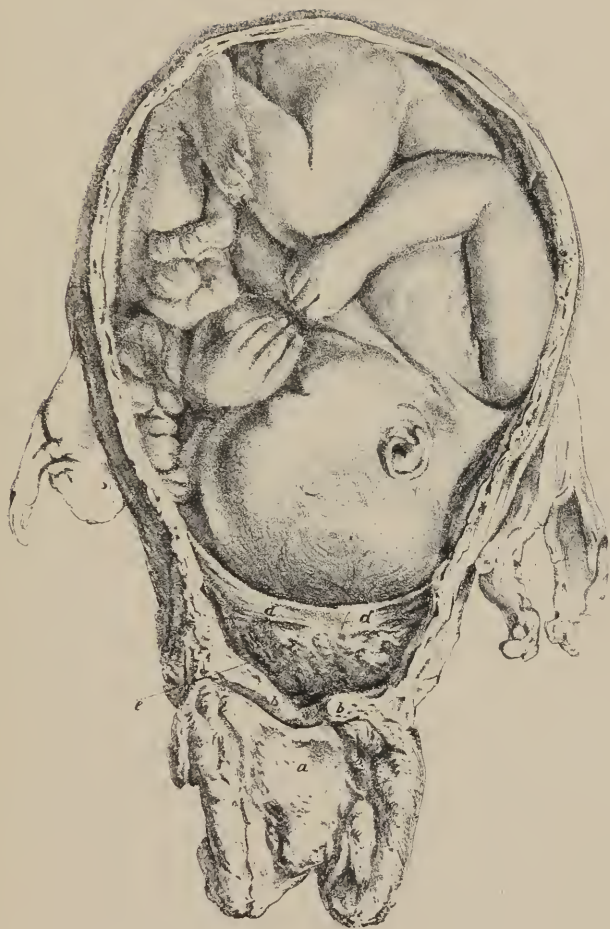
In marginal placenta prævia, the mouth of the womb is entirely free from the placenta, but by feeling around the margin of the os uteri the finger detects the placenta upon one side, just at the edge of the lumen of the os.

In lateral placenta prævia the placenta is attached to the lower uterine segment above the os, and often cannot be found by examination. Its situation must be inferred from the hemorrhage which occurs when dilatation advances, and the lower uterine segment is distended.

In general terms it may be stated that placenta prævia is that location of the placenta from which it is detached from the uterus during the stage of dilatation. The important symptom of placenta prævia is hemorrhage occurring suddenly without recognized cause, often following the assumption of the erect posture ; it is usually not difficult to confirm a diagnosis by examination.

The dangers of placenta prævia to the mother arise from hemorrhage and shock, and collapse following, and also from septic infection ; the dangers to the child are caused by asphyxia following the premature detachment of the placenta and the cutting off of the supply of maternal blood.

The treatment of placenta prævia consists, in the interest of the mother, in preventing hemorrhage and septic infection, in the interest of the child, in securing delivery as promptly as possible. Hemorrhage can usually be controlled until dilatation is sufficiently advanced to secure delivery by the use of the antiseptic tampon. Iodoform gauze is the best material for this purpose, and may be cut into strips three inches wide and three or four feet long ; such a tampon should be used in cases where the hemorrhage is not severe and sudden, and where dilatation is so little advanced that combined version or internal version cannot be employed. The end of the strip of gauze should be inserted within the os and cervix against the placenta, and the parts should



POSITION OF PLACENTA OVER OS UTERI, FROM BODY OF A WOMAN WHO DIED OF UTERINE HEMORRHAGE IN THE NINTH MONTH OF PREGNANCY. PLACENTA PRÆVIA CENTRALIS. (*Martin.*)

be thoroughly distended by the tampon. The vagina should also be moderately distended and uterine contraction stimulated if necessary by gentle friction or administration of small doses of ergot. When, however, central placenta prævia

FIG. 109.

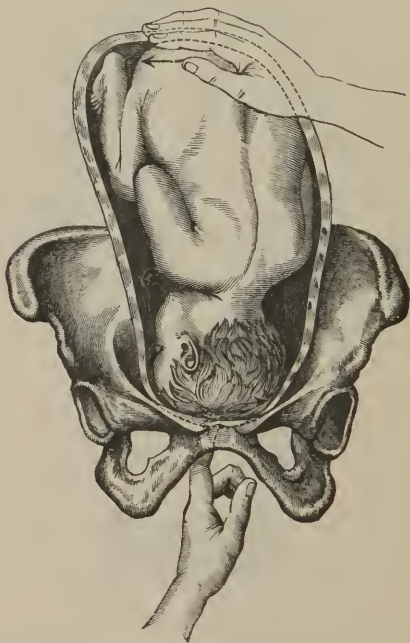


PLACENTA PRÆVIA CENTRALIS; INTRODUCING THE HAND TO BRING DOWN THE FEET.

exists, the physician should be prepared, as soon as he can introduce several fingers or his hand into the uterus, to force his hand through the placenta, seize a foot and bring down the breech of the child to act as a tampon (Fig. 109).

In partial, marginal, and lateral placenta prævia, if the head presents, and uterine contraction is good, it is often sufficient to rupture the membranes, when the head will compress the placenta between it and the side of the pelvis, thereby stopping hemorrhage ; in cases where dilatation proceeds

FIG. 110.



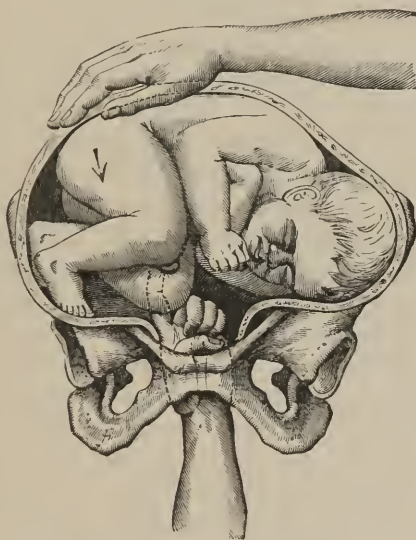
COMBINED VERSION, PUSHING UP THE HEAD.

slowly, a Barnes' dilator can be used to hasten delivery ; hemorrhage can also be checked by bringing down the fetus by combined version to act as a tampon.

For this purpose it is well to place the patient across a bed, and under partial anesthesia, with careful antiseptic precautions,

to introduce two or three fingers of the hand which is opposite the feet of the child, pressing the head and shoulders up, while the other hand pushes the breech down by external pressure; an anesthetic is of greatest service in securing sufficient relaxation of the uterus and abdominal muscles to permit of this manipulation; a foot is then seized and the breech drawn down acting as a tampon. In the less dangerous forms of

FIG. 111.



COMBINED VERSION, BRINGING DOWN THE LEGS.

placenta prævia, when the head is presenting and dilatation is almost complete, it is often possible to rupture the membranes and apply forceps in the interests of both mother and child (Figs. 110 and 111).

After delivery in cases of placenta prævia, the uterus should be thoroughly explored to be sure that no fragments of

placenta remain. A hot intra-uterine douche of half a gallon of solution of carbolic acid, 2 per cent., thymol 1 to 1000, or creolin $\frac{1}{2}$ per cent., should be given, followed by the introduction into the uterus of a suppository containing 60 grains of iodoform, or iodoform gauze.

The profound anemia which accompanies placenta prævia requires active and persistent stimulation. Hypodermic injections of ether, digitalis, strophanthus, strychnia and whisky or brandy are familiar agents of proven value; if the patient is especially nervous and restless, morphin and atropin will often be of service; rectal injections of whisky and milk, two ounces of each, will be found very useful; in extreme cases some method of transfusion is often of great value. Transfusion is of two kinds: one in which fluids are brought into the circulation from without; the other method is that by which the blood of the patient is retained so far as possible in the circulation of the brain and spinal cord; in the first, while defibrinated blood has been found of great value, the difficulty of procuring it and the time and apparatus required render it inconvenient. A dilute solution of salines containing six-tenths of one per cent. of sodium salts forms a useful and easily procured fluid for transfusion; sodium chlorid and sodium bicarbonate are the best substances available for this fluid; if possible, water which has been boiled and filtered should be employed, or distilled water. In the absence of any means for making an accurately measured fluid, it is sufficient to add to water two parts of salt and one of sodium bicarbonate, until the water tastes slightly saline; it should then be heated to a temperature of 100° F., and introduced into the body of the patient through a thoroughly cleansed tube and needle; this is best accomplished by gravity. A rubber tube being attached to the needle and terminating in a small funnel or fountain syringe, the needle should be introduced for a quarter or half inch obliquely in the connective

tissue above the clavicles, in the abdominal wall or below the axillary spaces.

As much fluid as will be taken up by the tissues may be introduced, the funnel or syringe bag being constantly full to prevent the entrance of air ; several ounces of fluid can usually be inserted at each puncture, the tissue around the seat of puncture being rubbed gently to further the passage of the fluid into the connective tissue spaces.

Auto-transfusion consists in bandaging the patient's limbs from the lower extremities toward the trunk and in raising her feet sufficiently high to favor the retention of blood in the brain and spinal cord. She may keep on these bandages, and in this position for a number of hours, until sufficient stimulants and fluid can be given to maintain the action of the heart, when the circulation is allowed to go on at its usual rate in the periphery ; where respiratory failure threatens, inhalation of oxygen has proven of decided benefit.

It is of the greatest importance that not only should the mother be skilfully treated to prevent hemorrhage, with its results, but that the most careful antiseptic precautions should be taken during her labor ; special attention should be given to cleanliness in her bedding, and as regards the hands and instruments of those who care for her.

CHAPTER XXXVI.

EXTRA-UTERINE OR ECTOPIC PREGNANCY.

While the usual location of the ovum is within the uterine cavity, yet in probably as many as one case in one hundred it lodges and develops outside the cavity of the uterus. The cause of this unusual location of the ovum is some disease of the oviduct which prevents the passage of the ovum from the ovary to its usual location in the uterus; it is often the case that women who have borne children are more liable to this accident than those who have not.

Symptoms of extra-uterine pregnancy are usually those of normal intra-uterine pregnancy; the uterus becomes slightly enlarged, a deciduous membrane forms within its cavity, there is often a cessation of menstruation, and the usual subjective symptoms of early pregnancy are present. The most usual location of the ovum outside the uterus is in one of the oviducts; it occasionally lodges in that portion of the uterine wall where the oviduct passes into the uterus, and rarely it remains at the outer surface of the ovary itself; it is asserted by some and denied by others that the ovum occasionally lodges in the abdominal cavity. So long as the ovum does not become too large for the oviduct, its presence may give rise to no condition which can be detected by examination; the patient presents symptoms of early pregnancy, and, if kept under close observation, the physician may notice that the uterus does not enlarge progressively as would be the case in normal pregnancy (Fig. 112).

In tubal pregnancy, however, the ovum soon becomes too

large for the oviduct, and although the latter is capable of considerable distention, and its muscular tissue may hypertrophy to a very great extent, yet, at about the third or fourth month, the ovum bursts the oviduct, and either remains adherent to the ruptured tube or else escapes between the folds of the broad ligament or into the abdominal cavity.

The symptoms of such rupture are pain, sudden, sharp, severe in character, and the discharge of deciduous membrane and blood from the uterus; before rupture, at about the third or

FIG. 112.



TUBAL PREGNANCY.

fourth month, a tumor as large as a small orange may possibly be felt at one side of the uterus; after rupture, this may be unrecognizable or still be indistinctly outlined; after rupture the ovum may drop into such a position between the folds of the broad ligament that the clot of blood which is poured from its sac at the moment of rupture is limited by the surrounding serous membrane, forming an hematocoele; should the ovum rupture into the abdominal cavity, hemorrhage may persist and become fatal.

In the former instance, the symptoms of shock which ac-

company rupture gradually grow less, and the patient may rally without treatment, except rest in the recumbent position ; after rupture into the abdominal cavity shock persists, a condition of coma ensues, and the patient perishes from the effects of hemorrhage. Where the ovum escapes into the abdominal cavity, it occasionally becomes encysted, the placenta is developed from the mesentery or from the intestines, and pregnancy continues to full term or even longer ; a living child has been delivered after such pregnancy ; when pregnancy persists and the fetus perishes, it usually becomes mummified or macerated, and occasionally calcareous deposits form which turn it gradually into a stone child or lithopedion ; in this condition it may be retained in the abdomen of the mother indefinitely.

Interstitial pregnancy usually ends by rupture of the tube just where it enters the uterine wall or by the escape of the ovum into the cavity of the uterus.

Ovarian pregnancy ends in rupture, the ovum escaping into the abdominal cavity or becoming encysted, possibly developing. It occasionally happens that the uterus retains to some degree its fetal form and development, and this may render possible the lodgment and growth of the ovum in one of the horns of the uterus ; in such cases the ovum may develop for a few months, but sooner or later rupture will occur, with the usual symptoms before narrated ; in exceptional cases an ovum develops to a period of viability in this manner. Cases are reported of an extra-uterine pregnancy followed by an intra-uterine pregnancy, the ovum in the first case dying and becoming encysted, and its removal by operation resulting in abortion of the second intra-uterine ovum. In cases where rupture of the fetal sac occurs and death of the extra-uterine fetus, nature often regards the fetus as a foreign body and seeks to remove it by ulceration into the bladder and vagina or rectum ; such a process has

even been observed to open the abdominal wall near the umbilicus.

The diagnosis of extra-uterine or ectopic pregnancy is uncertain before rupture of the fetal sac ; it is rarely positive and clear. Hence those methods of treatment are most reliable which confirm beyond doubt the diagnosis of the physician, for it is only by careful analysis of the symptoms of each case, combined with a knowledge of the pathology of such cases, that the physician can hope to make a correct diagnosis. When the presence of this condition is suspected, and good reasons exist for the suspicion, the most natural theory of treatment is that which regards the extra-uterine ovum as a foreign body to be treated as other foreign bodies, by removal ; efforts have been made to kill the ovum by the application of electricity, the aspiration of fluid from the fetal sac, or an injection into the ovum of morphia ; the first of these expedients has in some cases been successful, the second and third are rarely successful, and none of these procedures should be the choice of the physician. When the patient will not allow the physician to perform or have performed laparotomy, he is justified in giving other methods of treatment a trial, but they are not the best possible expedients.

The most desirable treatment, so soon as rupture occurs, is opening the abdomen, removing the ovum and its appendages with the ruptured oviduct, thereby checking the hemorrhage promptly. Such is the education of the modern physician that no one should practice obstetrics who is not prepared, should an emergency arise, to operate in this manner ; in cities where specialists and hospitals abound, a conscientious physician will often summon a brother surgeon, and procure for his patient the benefit of his greater technical skill ; but the obligation of the practitioner, whether he be alone, or whether in easy reach of assistance, remains the

same, namely, that he either controls threatening hemorrhage himself, or procures for his patient some one who can and will do it.

After the removal of the ovum and the tube, and the ligation of bleeding vessels, the abdomen may be advantageously irrigated with hot water ; the use of the drainage tube may be determined upon in accordance with surgical principles which are generally taught. In cases where the fetus is expelled by suppuration, the fetal sac should be treated like an abscess cavity ; drainage should be carefully maintained through the aperture by which the fetus has been extruded ; antiseptic injections should be made into the sac, and the patient supported by suitable food and stimulants. In cases where the fetus has developed in the abdominal cavity, the obstetrician may delay operation until the fetus be viable, provided the patient is under observation and easily accessible ; when viability has been reached, the abdomen is to be opened, the fetal sac incised, and the fetus removed and resuscitated ; the cord should be ligated and cut close to the placenta. No effort should be made to separate the placenta and membranes from their attachments if these attachments are formed, and such effort causes free hemorrhage ; the membranes should be sutured to the edges of the lower portion of the abdominal incision, and a large drainage tube passed into the fetal sac ; the placenta and membranes will be gradually eliminated by a process of conservative necrosis ; at the end of a week or ten days the placenta can be cautiously removed, and the cavity left will gradually close by granulation ; during this process this cavity should be treated with antiseptic applications.

In cases of interstitial pregnancy operation should consist in the removal of the fetus, and the amputation of the uterine cornu with sufficient resection of the uterine wall, if necessary, to bring about coaptation.

It must also be observed that extra-uterine pregnancy must be more frequent than has been commonly supposed, and that a considerable number of such cases terminate in spontaneous recovery ; such are those in which the ovum dies in the oviduct before rupture ; where the ovum and its clot become encysted immediately after rupture and remain inert for an indefinite time ; the existence of such a possibility, however, cannot lessen the responsibility of the physician in the study and treatment of these cases.

CHAPTER XXXVII.

POST-PARTUM HEMORRHAGE.

Bleeding from the uterus after delivery is normally prevented by uterine contractions, whereby the muscular fibers of the uterus compress its sinuses. The condition of the mother's blood at the end of pregnancy favors rapid and firm clotting of blood in the uterine sinuses. The small vessels of a healthy endometrium do not readily rupture, and persistent oozing of blood from the endometrium does not occur after labor in a healthy woman.

Arterial bleeding from the uterus follows extensive laceration of the cervix which wounds the circular artery of the uterus. Ordinarily, however, lacerations of the cervix do not extend sufficiently to wound an artery, and only capillary oozing is observed.

Post-partum hemorrhage may also follow laceration of the vagina and pelvic floor. It is rare to observe such bleeding which does not cease spontaneously ; the hot vaginal douche, followed by an antiseptic tampon, is generally sufficient for these cases ; if not, immediate suture is required.

As post-partum hemorrhage is most frequently uterine hemorrhage, the obstetrician is especially concerned with those causes which produce the relaxation of the uterine muscle and ensuing bleeding. After labor, in cases where the uterus has been overdistended by more than one fetus during pregnancy, hemorrhage may be feared, as an overstretched muscle is often a parietic muscle. In poorly-developed women the uterine muscle is ill-developed in common with the voluntary muscles, and relaxation after labor may occur. When the uterus has

been exhausted in complicated labor, as after transverse position followed by version, hemorrhage must be feared. Infections which profoundly affect the mother's blood, rendering it less coagulable than normally, favor hemorrhage. Shock and injury to the nervous system which depress the nervous supply of the uterus cause relaxation of the uterine muscle and hemorrhage.

Many cases of hemorrhage are caused by the improper conduct of labor. Rapid delivery, failure to stimulate the uterus to contract by friction after the placenta has been expelled, removing the placenta by pulling on the cord, and failure to properly stimulate the nervous system of a weak patient, are among the most common errors producing hemorrhage.

The symptoms of post-partum hemorrhage are rapid, soft pulse, a large doughy tumor in the abdomen, alarm or prostration on the patient's part, with thirst, sudden failure of vision or sense of suffocation, and the discharge of blood from the vagina. These symptoms are mentioned *in the order of their relative importance*. It must be remembered that most alarming hemorrhage may occur *with no discharge of blood for several minutes*. Hence the wise precept: "Do not leave a woman after labor when the pulse is 100, or above," as there is a liability to hemorrhage. If the practitioner is intelligent enough to detect a relaxed condition of the uterus *before* blood has escaped through the vagina, he can control hemorrhage before it becomes dangerous. When the condition of the pulse excites suspicion, the abdomen should be examined at once; the firm tumor formed by the well-contracted uterus will be absent; an ill-defined mass will indicate the location of the enlarged and relaxed womb.

Post-partum hemorrhage is rare in cases conducted by intelligent physicians. The best methods of conducting labor favor good contraction of the uterus and render the occurrence of hemorrhage infrequent. When the uterine muscle

is not allowed to become over-distended by delay in complicated labors ; when delivery in normal labor is not hurried ; when time is taken to secure a normal third stage of labor and the placenta is delivered by expression, hemorrhage rarely occurs.

The treatment of this condition consists in *instantly* examining the abdomen so soon as the pulse occasions suspicion or blood flows from the vagina. Failing to find the well-contracted uterus, the hand is placed broadly on the abdomen, and rapid friction, with a kneading movement, is made. The uterus will respond better to rapid light massage than to more violent and slower manipulation. As soon as the uterus can be defined by the hand, it should be grasped. The fingers are best placed behind the fundus, deeply in the middle line of the abdomen ; the thumb holds the uterus in the middle of its anterior surface in front ; the back of the hand is above, over the fundus. Pressure should be made in the axis of the pelvis, downward and backward, not laterally. In lateral pressure an enlarged ovary may be compressed between the hand and the uterus, and sudden, excruciating pain, with symptoms of shock, have been seen to follow such compression.

If a nurse is available, she may give the patient a hot vaginal injection of a gallon of water that has boiled, at a temperature of 100° F. to 110° F., while the physician manipulates the uterus. Water as hot as the nurse can taste may be taken in the lack of more accurate measurement. A hypodermic syringe full of ergot (fluid extract) may be injected deeply into the subcutaneous tissue at the sides of the abdomen ; ergotine may be employed in doses of 20 minims in the same manner. Strychnia may also be injected in $\frac{1}{20}$ grain doses. If the uterus contracts under this treatment, the hand should rest upon the fundus, without massage, until the pulse and general condition of the patient

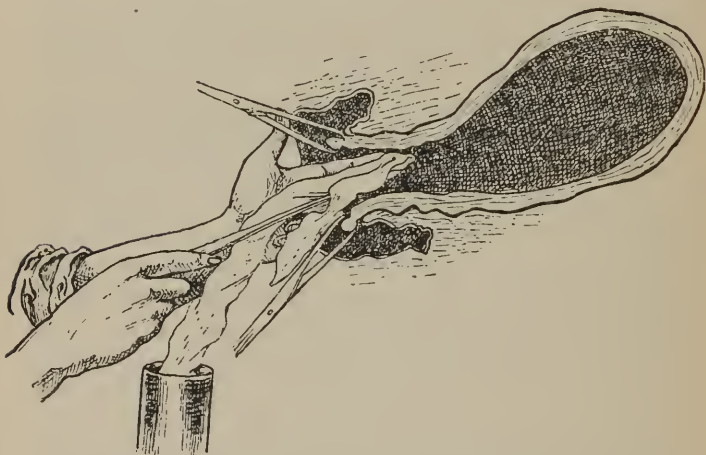
warrant the belief that danger is over. Several large towels may then be taken and folded in suitable pads. One is to be placed across the abdomen, behind the fundus; one on each side of the uterus; a broad, strong binder should then be pinned firmly around the patient, from above downward, reaching from the umbilicus to the trochanters. Ergot or quinia may then be given by the mouth, and the patient put perfectly at rest. When the physician or nurse is intelligent in observing the pulse, it is safe to bandage the uterus. When no such intelligent care is available, it is better not to apply pads and bandage, but trust to the hand upon the uterus, with constant watchfulness.

The majority of cases of post-partum uterine hemorrhage yield to this treatment if recognized promptly. When the physician does not reach his patient until she is already reduced by hemorrhage, he must add active stimulation to the treatment described. The patient's head should be lowered, and the foot of her bed raised three feet and more higher than the head. Auto-transfusion and the injection of saline solution into connective tissue spaces may be done to advantage. Rectal injections of whisky, $\frac{1}{2}$ z, and hot milk, $\frac{1}{2}$ z, may be given. If massage, ergot and hot vaginal douches fail to secure uterine contraction, the uterus should be douched with hot water, a vaginal douche having been first given.

If the uterus still refuses to contract, a strip of iodoform gauze four feet long and three inches wide should be grasped by uterine dressing forceps. While one or two fingers of one hand guide the forceps to the os, the other hand, grasping the forceps, should carry the end of the gauze to the fundus of the uterus (Fig. 113). The mere presence of a strip is usually enough to excite contraction; but if great relaxation is present, the uterus may be moderately tamponed, the remainder of the strip being used as a vaginal tampon. This

strip of tampon may be left twenty-four hours if antiseptic precautions have been carefully observed. It should then be removed, the vagina and the uterus douched with creolin, 2 per cent., carbolic acid, 2 per cent., or thymol, 1 to 1000, and, if needed, the tamponing may be repeated. In the absence of iodoform gauze, bichlorid gauze, or a rolled bandage or strips of muslin dipped in bichlorid solution,

FIG. 113.



TAMPONING THE UTERUS FOR HEMORRHAGE.

1 to 10,000, or whisky and water may be used. In hospital practice a Faradic battery should be part of the equipment of each lying-in ward, as the Faradic current, one pole over the uterus, the other over the spinal cord, is of value in these cases.

Vinegar or lemon-juice squeezed into the uterus, or a lump of ice placed in the uterus, are domestic remedies which are useful in the lack of better.

Where nervous prostration and excitement are present, opium and alcohol are of advantage. Morphia, gr. $\frac{1}{8}$, and atropia, gr. $\frac{1}{200}$, hypodermically, with frequent injections of ether or brandy, are valuable agents.

Where post-partum hemorrhage is caused by rupture or laceration of the uterus, or laceration of the vagina, surgical treatment is requisite. The extirpation of the uterus by abdominal incision, immediate suture of a lacerated cervix or vagina are indicated, and under antiseptic precautions may save life.

It occasionally happens that bleeding from a diseased endometrium, or bit of retained placenta, persists after labor, or occurs in the puerperal state. Hot antiseptic intra-uterine douches are first indicated; in the event of their failure, the uterus should be thoroughly scraped with the blunt douche-curette and tamponed with antiseptic gauze. Intra-uterine suppositories should be used for several days after the removal of such tampons.

In post-partum hemorrhage in patients whose blood is profoundly impaired, inhalation of oxygen is useful; in malarial cases, the hypodermic injection of 30 grains of bisulphate of quinia in freshly-made camphor water has been found of value.

During convalescence from post-partum hemorrhage, inhalation of oxygen and the administration of arsenic, with or without iron, give excellent results.

CHAPTER XXXVIII.

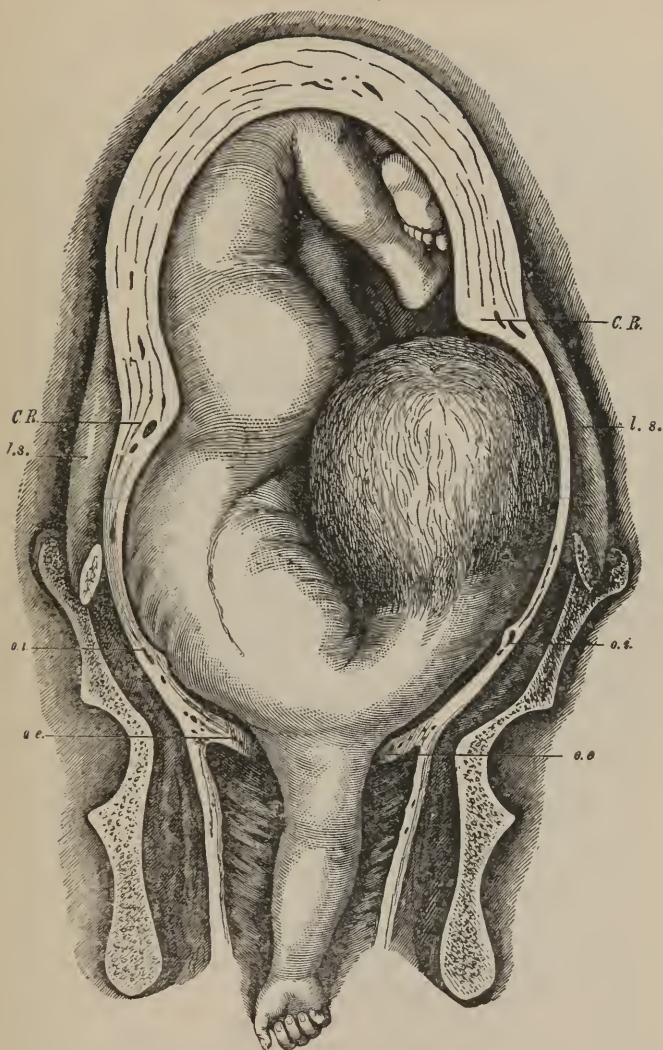
THE ACCIDENTS OF LABOR ENDANGERING THE MOTHER.

The mother's life may be suddenly threatened during labor by causes which modern knowledge of the physiology and pathology of labor has enabled the obstetrician to foresee and prevent in the majority of cases. One of these accidents which is largely preventable is rupture of the uterus.

When the expulsion of the child is delayed and the uterus continues to contract, the upper expulsive segment becomes firmly contracted in a condition of tetanus; the lower elastic segment is distended more and more by the continued pressure from above and by the settling down of the presenting part. The junction between the two segments is marked by the lower edge of the upper expulsive segment which forms a firm and prominent ring to be plainly felt on palpation. This is the contraction ring of Bandl, and furnishes a symptom of threatened uterine rupture. If the uterine tetanus persists, and delivery is not accomplished, the uterus may tear asunder just below the contraction ring, on its anterior or posterior surface (Fig. 114).

Uterine rupture occurs in cases of transverse positions of the fetus, where labor is neglected and uterine contractions are vigorous. It also occurs in contracted pelvis, where the uterus labors hopelessly to expel the child, finally tearing. This accident is naturally more frequent in multiparæ who have borne many children than in primiparæ; also in multiple labor, because the uterus has been over-distended by more than one fetus. Weak, poorly-developed women are

FIG. 114.



THREATENED UTERINE RUPTURE.

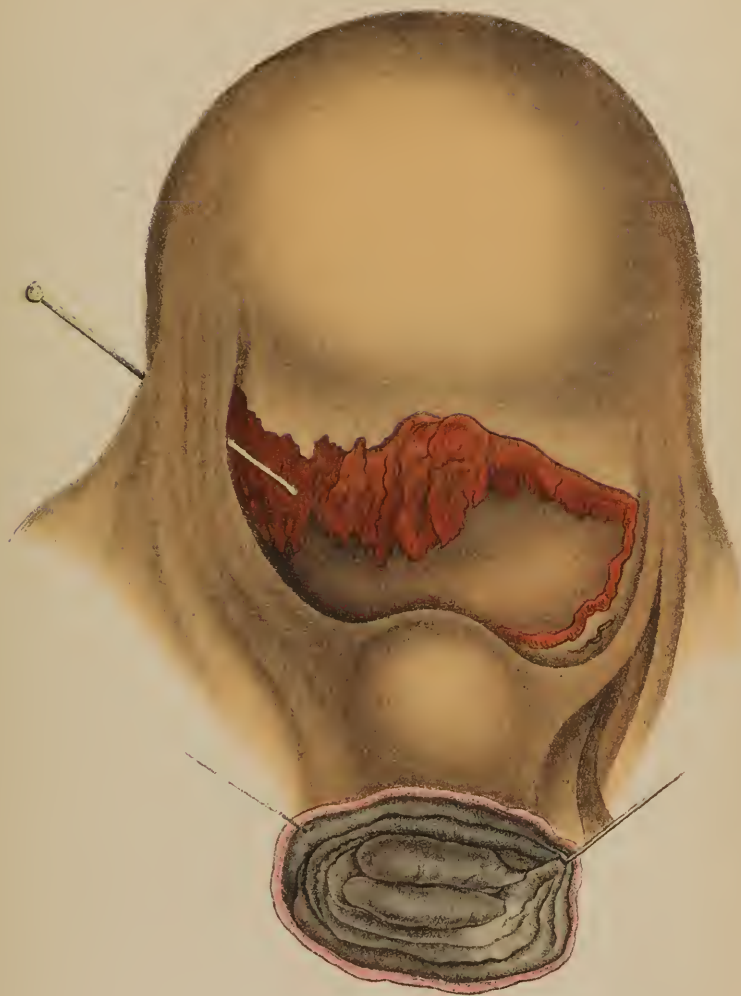
l. s. Lower uterine segment; *C. R.* Contraction ring; *o. i.* Internal os; *o. e.* External os.

more exposed to this accident if the child be large, and they become exhausted in labor.

Symptoms of threatened rupture of the uterus are the existence of a well-marked contraction ring; rise in the patient's pulse rate and temperature; a firm, unyielding condition of the upper uterine segment detected on palpation, and the exhaustion and irritability of the patient which are seen in delayed and complicated labor. The presenting part can often be felt through the abdominal wall projecting above the brim of the pelvis.

Actual rupture of the uterus is characterized by sudden cessation of uterine contraction, with the complaint of sudden and excruciating pain by the patient, followed by shock. The shape of the uterus changes, and an escaped portion of the fetus can often be felt through the abdominal wall. Hemorrhage through the vagina may or may not be present.

The treatment of rupture of the uterus will depend upon the extent of the rupture and the possibility of delivering the child through the vagina. Where the uterus tears across the larger part of its anterior or posterior surface, the fetus will escape into the abdominal cavity, and must be delivered by abdominal incision. The uterus can be sutured and allowed to remain, or removed with the ovaries, or amputated at the cervix. Where but a partial rupture occurs, the obstetrician will endeavor to deliver the child through the vagina, bringing the portion of the fetus which escaped back into the uterus through its aperture of exit. Version should be avoided if possible, as likely to increase the rupture. The rent in the uterus may then be tamponed through the vagina with iodoform gauze, which is brought out through the vagina as a drain, or a drainage tube is inserted and gauze is packed about it. Under frequent disinfection of the vagina and irrigation through the uterine rent with boiled water, with the continued use of the tampon or drainage tube, a considerable

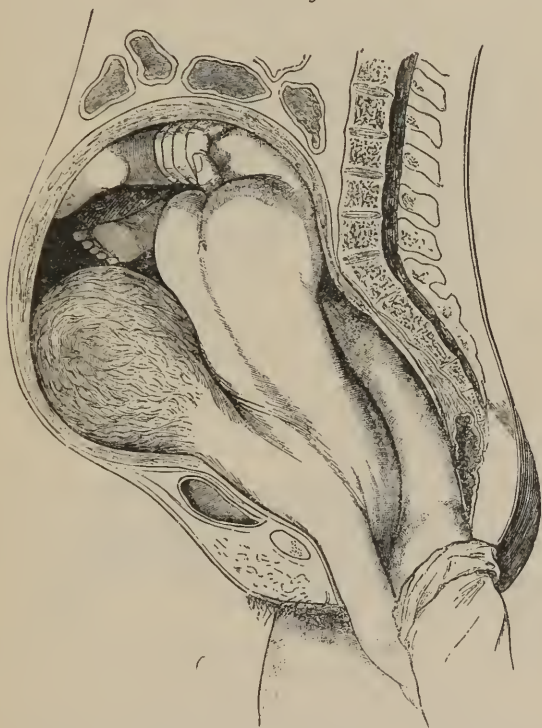


Transverse Rupture of the Anterior Cervical Wall.

(Spiegelberg)

proportion of cases of partial rupture recover. In complete rupture, if delivery be effected promptly and the uterus be skilfully sutured or removed, the patient may recover. In either case uterine rupture is one of the gravest accidents of labor.

FIG. 115.



VERSION IN THREATENED RUPTURE OF THE UTERUS.

Where rupture is threatened, prompt action is necessary. It is of first importance to secure uterine relaxation and relieve the condition of uterine tetanus existing. This is best

effected by deep chloroform anesthesia, this anesthetic being superior to ether for such cases. The injection of morphia is also of value, and the hot bath or hot applications have been found useful. Brandy may be given by hypodermic injection in free doses. If the fetus is dead, it should be delivered in the manner least likely to injure the mother; embryotomy will usually be advantageous. If the fetus lives, version or forceps will be chosen, as the presentation and dilatation of the birth canal may indicate, version *before* uterine rupture and under deep anesthesia being a most valuable expedient (Fig. 115).

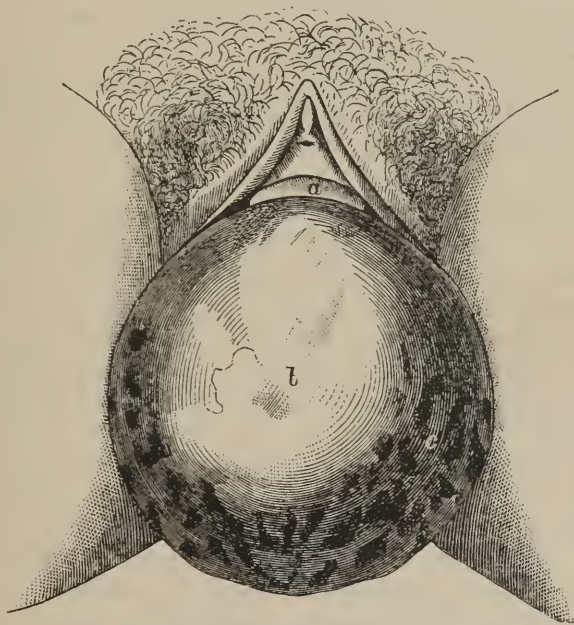
Fetal mortality in threatened and actual uterine rupture is very high. Long-continued pressure by the upper uterine segment, and the inspiration of blood and abdominal fluids, where the fetus escapes into the abdomen, usually kill the fetus by asphyxia. Its chance for life is so slight that it is commonly disregarded in the presence of the great danger which threatens the mother, except in very favorable cases.

INVERSION OF THE UTERUS.—By traction upon the placenta through the cord, by sudden violent pressure upon the fundus, and by spontaneous, but forcible uterine contractions, the womb may be inverted or turned wrong side outward. This accident is most apt to happen to weak and exhausted patients, in cases where the uterus has been over-distended during pregnancy and labor, or in women whose muscular development is deficient.

Symptoms of inversion of the uterus are pain, shock and hemorrhage, and the appearance of a uterine tumor in the vagina. This tumor may vary in size, from a mass the size of a large orange in cases where the fundus only is inverted, to a tumor as large as a man's two fists hanging between the thighs. The diagnosis of an inverted uterus is not always easy. A prolapsed and inverted bladder and a fibroid polyp of the uterus may simulate the inverted uterus. Should the

placenta be adherent, it will be at once evident that the tumor is the uterus. A diagnosis in these cases is to be made by a careful examination. The bladder must be emptied by a catheter; bimanual examination will reveal the absence of the uterus above the pubes, and an attempt to pass a sound

FIG. 116.



INVERSION OF THE UTERUS.

a. Upper vaginal wall. *b.* The inverted uterus.

into the uterus will demonstrate the nature of the accident (Fig. 116).

Uterine inversion is one of the most serious accidents of labor. Death from exhaustion soon after labor, or from sepsis, if the patient survives the accident, commonly results

when inversion is complete. The treatment of this condition consists in restoring the uterus to its normal condition. Pressure by the antisepticized hand, the uterine tissue being protected by a pad of antiseptic gauze, should be immediately made upon the fundus, in the pelvic axis. While force must be exercised, it should be done in a gentle, steady manner, and should be continued for from five to fifteen minutes at a time, with counter-pressure over the pubes. The patient's general condition demands attention in these cases; antiseptic douches are of value in promoting reposition and preventing sepsis, and pain should be mitigated by the injection of morphia and atropia, and shock combated by the injection of brandy or ether.

If the physician be called to a neglected case of inversion of the uterus, in which septic infection is threatened by an infected uterus, its removal will afford the patient her best chance for life.

LACERATION OF THE CERVIX UTERI occurs in the majority of first labors, but is slight in extent. Under precautions to avoid septic infection, such lacerations heal without suture. In cases of rapid delivery, and in spontaneous, precipitate labors, laceration extending to the attachment of the vagina may occur, causing hemorrhage, which demands treatment. Immediate suture is the proper treatment for such an accident. One suture of stout silk, catgut or silver wire on each side will commonly result in good union. If the patient is too exhausted to permit of suturing, iodoform gauze tampons may be used to check hemorrhage.

CHAPTER XXXIX.

LACERATION OF THE PERINEUM AND PELVIC FLOOR.

Laceration of the perineum and pelvic floor requires the prompt attention of the physician. This accident occurs more frequently than many practitioners will admit, as its confession implies a want of skill in the minds of many. If all lacerations which extend beyond the fourchette, or posterior commissure, be called laceration of the perineum, many of the marvelous records of hundreds of cases without a laceration would disappear. Clinically, all lacerations which extend beyond the fourchette should be sutured whenever possible. In hospital practice this can be readily accomplished ; in private practice the physician is often led to omit suture and depend upon spontaneous union under cleanliness. It is true that union often results in laceration of moderate extent without suture, but such treatment is not the most scientific and thorough. It is the rule among careful obstetricians to suture all lacerations half an inch in length, including the posterior commissure, and certainly no great mistake can be made by following this rule.

If free hemorrhage exists, a tampon of gauze may be applied, and the obstetrician will wait for several hours until it ceases. He may also wait for daylight and to secure rest for his patient to advantage. In lacerations not extending to the rectum, silk or silver wire may be used to advantage for suture material. In lacerations to or through the bowel, catgut will be needed in addition to the other. A curved needle upon a handle is preferred by some ; others use the ordinary curved surgeon's needle, in needle forceps. The patient is brought to the edge of a bed or table, her feet on chairs or

supported by assistants. Except in immediate suture, or

FIG. 117.

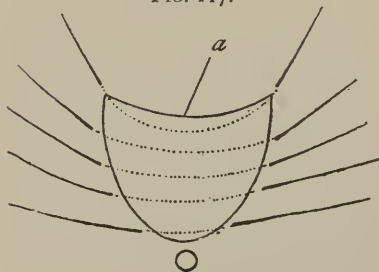


FIG. 118.

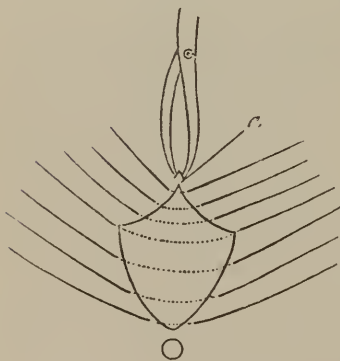
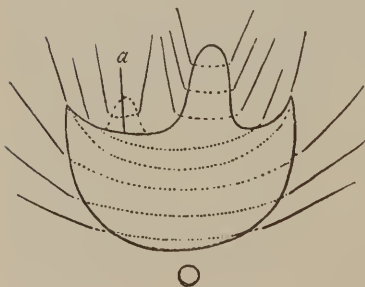


FIG. 119.



where but one or two stitches are required, anesthesia is necessary for an accurate closure. The operator will require needles, needle-holder, or needle on fixed handle, scissors, a pair of tenaculum forceps or a tenaculum, a pair of hemostatic forceps, and suture material. A vaginal douche of a gallon of bichlorid solution, 1 to 5000, at a temperature of 100° F., may first be given. Anti-septic precautions having been taken with the operator's hands and instruments, a simple laceration, as shown in Fig. 117, is to be closed with silk or silver wire, by passing the sutures beneath the entire wound from the lower end upwards. The letter *a* represents the highest point of the laceration. In Fig. 118 the same laceration has been altered in its shape by drawing the point *a* up-

wards with a tenaculum forceps, for convenience in approximation.

It is frequently the case, in primiparæ especially, that in addition to a central tear in the perineum, lacerations are found extending up into the vaginal tissues on one or both sides. In Figs. 119 and 120 such lacerations and their closure are illustrated by diagrams, the point *a* being the highest point in the true perineal laceration.

FIG. 120.

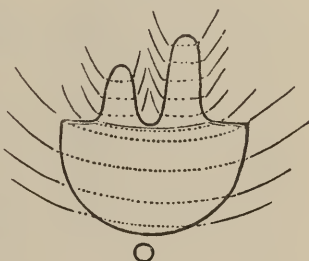


FIG. 121.

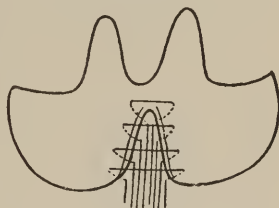


FIG. 122.



In Fig. 121 the method of closing lacerations extending into the bowel and upward into the vagina on each side is illustrated. The bowel is closed from within outward by stitches of fine catgut, and the laceration is thus converted into one illustrated in Fig. 122, and closed by silk, silkworm gut, or silver as there represented. When an obstetrician has become experienced in the use of catgut, and possesses catgut of good quality, he may close perineal lacerations by the continuous catgut suture, as shown in Figs. 123 and 124. Where primary union does not result after the closure of perineal injuries, in eight or ten days after the operation the patient may be anesthetized, the granulating surfaces scraped with a curette and closed by suture. If thoroughly done this procedure rarely fails.

The after treatment of these cases consists in careful anti-sepsis. Three or four douches to the perineum and lower portion of the vagina should be given in twenty-four hours, of bichlorid solution, 1 to 8000, or creolin, 1 per cent. Anti-septic pads or napkins should be kept on the vulva. The use of the catheter should be avoided, and the parts cleansed after each urination instead. Loose bowel movements should be obtained after the third or fourth day. It is an unnecessary precaution to bind the legs together in rational, reasonable patients. If the sutures do not annoy the patient they

FIG. 123.

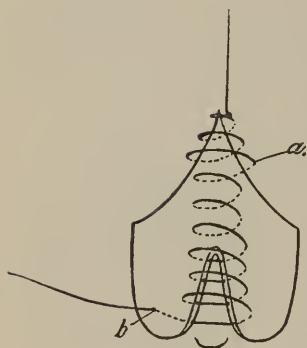
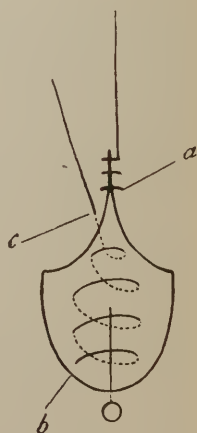
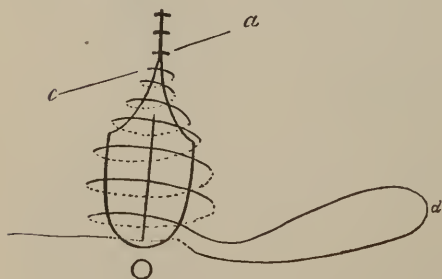


FIG. 124.

FIG. 124.



may remain ten days, when union results. In extensive

laceration they may be left two weeks. The patient should remain recumbent for at least two weeks after the laceration is closed.

SUDDEN DEATH DURING LABOR is caused by the formation of a clot in the heart, by the entrance of air into the circulation through the uterine sinuses, and by sudden shock and syncope occurring after uterine rupture. The symptoms of threatened death are those of cardiac syncope, faint, rapid pulse or sudden cessation of the pulse, pallor of the features, sudden mental alarm and distress, with rapid unconsciousness. The most prompt stimulation for the heart and brain is demanded. Hypodermic injections of ether, raising the foot of the bed several feet, atropia, ammonia and brandy or whisky by hypodermic injection, and where oxygen is available, the inhalation of this gas, are all demanded with the greatest promptness. Manipulations to accomplish delivery must cease, and attention be given to resuscitating the patient. Unfortunately, many of these cases perish before more than one effort can be made to save them.

The possibility of heart-clot and the entrance of air through the placental site should be borne in mind in cases of post-partum hemorrhage, and such patients should not be allowed to sit up, and should be prevented from sudden exertion so far as possible. In removing a placenta in these cases, as little violence as possible should be exerted, and uterine contractions maintained by pressure and massage over the uterus.

THROMBOSIS OF THE VEINS ABOUT THE VULVA AND VAGINA is an accident of labor which may result from violence during delivery or without apparent cause. The appearance of a bluish-red tumor near the labium, with the complaint of pain on the part of the patient, enables the physician to recognize the accident. If labor can be completed without rupturing the tissues which cover the thrombus, care should be exercised that the external air does not find entrance. If bleeding goes

on and the thrombus is accompanied by the extravasation of blood into the cellular tissue through the rupture of capillary vessels, the tumor should be laid open under careful antiseptic precautions, the clot turned out, and the cavity packed with antiseptic gauze. Labor should then be completed, and a compress and antiseptic napkin worn after delivery. The after-treatment of such a cavity consists in its thorough disinfection, and securing healing from the bottom by the continued use of the tampon. When labor is completed without rupture, an antiseptic pad and pressure by a T-bandage will favor the absorption of the clot.

In difficult delivery by forceps or version and extraction the PUBIC JOINT has been RUPTURED. This accident is marked by sudden pain and yielding of the joint, which is appreciated by the physician. It may or may not be accompanied by laceration of the tissues beneath the pubes. If the joint surfaces do not become infected by sepsis, compression, by plaster-of-Paris bandage, or by a firm binder, is sufficient. Suppurating arthritis has followed injury to the pubic joint during labor, making it necessary to drain and disinfect the articulation. Recovery, with firm union, usually results in these cases.

In sudden death during labor, the physician's duty to the unborn child is a subject of interest and importance. Immediate delivery is the indication, to be accomplished as the circumstances of the case will best permit. If the genital canal is dilated and the head or breech presents, the forceps may be found efficient. In multiparæ, where the fetus is not favorably situated for the application of forceps, version has been successful. Where the genital canal is undilated, the extraction of the child by Cesarean section is indicated where the pregnancy is sufficiently advanced to give reason to hope that the fetus can survive.

CHAPTER XL.

PUERPERAL SEPSIS (PUERPERAL FEVER).

The most important, because the most deadly complication of labor and the puerperal state, is septic infection. At the present day it is quite needless to raise the question as to the nature of puerperal fever. The exact mode of its origin may not be clearly proven, but the fact that it is an infection, produced by an infecting agent which can be communicated, rests upon grounds beyond question. By puerperal fever we do not refer merely to rises in temperature occurring after labor; such fevers will be considered later. But prolonged variation in pulse and temperature of considerable degree, accompanied by constitutional symptoms which denote the presence of an actively poisonous agent, and by anatomical lesions, necrotic in character, form together a clinical picture formerly named puerperal fever, better known as puerperal septic infection. This disorder is identical with septic infection occurring in any recently wounded patient, whether a man crushed by machinery whose wounds become infected during handling by a careless surgeon, or a woman whose torn perineum is infected during labor by the dirty fingers of her attendants. This infection is produced by the action of living ferments, which directly destroy the tissue or plug up the circulatory channels of the body, or indirectly poison the patient by producing toxic alkaloids, which are absorbed.

The question arises as to whether these infecting germs are always communicated from without, or whether they may be found independently in the patient's body; in other words, whether puerperal infection is ever autogenetic. While it is

true that the body of the healthy woman never contains and can never develop these germs, it is also true that in the course of diseases previously communicated to the patient, poisonous agents are introduced which gain access to the wounds in the genital tract made during labor, and produce puerperal sepsis by infecting these wounds. Thus the germs of gonorrhea, syphilis or cancer may be present in the body before pregnancy ; and, finding access directly to the circulation through the wounds of labor, may produce sepsis.

The symptoms of puerperal sepsis will be best understood if we remember that the infecting germs may gain access through the lymphatics of freshly-made wounds in the vagina and vulva, or go directly into the circulation through the open sinuses at the placental site. In the first instance vulvitis and vaginitis, with the formation of a puerperal ulcer, develop, in three or four days, from contact of a dirty hand or instrument in the vagina after labor. In the second mode of septic infection, the infected hand of a careless obstetrician, who performs version or separates and delivers an adherent placenta, lodges infecting germs in the uterine wall, where the placenta was attached, and direct infection through open sinuses results.

The course of puerperal sepsis can best be comprehended by recalling the anatomy of the lymphatics of the genital tract, as the infection usually follows the course of these channels. The lymphatics of the vulva and lower fourth of the vagina communicate with the superficial inguinal glands, and thence through the saphenous opening to the deep inguinal glands or along the deep blood-vessels, finally entering the abdominal cavity. An infection planted in the vulva or lower portion of the vagina may finally spread to the peritoneum. Considerable time would be required, however, for this result to occur, and the usual symptoms of vulvitis and vaginitis, with puerperal ulcers at the posterior com-

missure, would have given ample warning of threatened danger.

From the cervix uteri and upper three-fourths of the vagina the lymphatics communicate with the deep iliac and sacral glands. Hence a focus of infection in the uterine cervix or in the upper part of the vagina readily infects the peritoneum.

In the uterine cavity lymphatic spaces are numerous in the uterine decidua, communicating with lymphatic channels in the serous covering of the uterus. From this surface lymphatics pass directly through the broad ligaments to the glands situated deeply on the posterior wall of the abdomen, in the lumbar region. It can readily be seen, then, how direct infection of the uterine decidua speedily causes peritonitis.

The least dangerous form of puerperal sepsis is vulvitis and vaginitis, resulting from infection of the vulva and lower fourth of the vagina. It is most common in women who have torn perineæ or fissures in the mucous membrane at the opening of the vulva. In forty-eight to sixty hours after labor the patient's temperature rises to 101° F., or 102° ; slight pain, burning, smarting on micturition, are felt about the vulva; a rigor may be experienced by nervous patients. The pulse is 100 to 120. On examination the labia are swollen, the mucous membrane reddened; at the posterior commissure abraded or lacerated surfaces are found, covered by a yellowish or faintly greyish deposit. The lochia may cease for a short time to be slightly purulent and offensive later. If the perineum has been sutured, the surfaces will not be healed by first intention, but the edges of the wound will be separated by pus, and the stitches will have loosened slightly.

The treatment of this condition consists in douching the vulva and lower portion only of the vagina with bichlorid of mercury solution, 1 to 5000, douches to be given four times

in twenty four hours. Half a gallon should be used for a douche, at a temperature of 100° F. The physician should thoroughly apply to ulcerated or fissured surfaces peroxid of hydrogen upon absorbent cotton, or tincture of iodine and a saturated solution of carbolic acid in glycerin equal parts, followed by the free use of iodoform or boracic acid as a dusting powder. It is well to thoroughly unload the bowels by calomel, gr. $2\frac{1}{2}$, and soda, gr. 10, followed by a saline or an abundant hot enema. Abdominal pain is best relieved by placing upon the abdomen a flannel wrung out of hot water, on which spirits of turpentine have been freely sprinkled. If stitches have been introduced, they should be at once removed, and ununited surfaces freely disinfected. The patient's diet should be of the most nutritious and digestible character, and alcohol should be given early to debilitated patients.

In cases where the infection begins at the uterus or upper portion of the vagina, the rapid spread of septic germs soon produces inflammation of the tissues about the uterus, and of the peritoneum which covers it. The first is *perimetritis*; the second, *parametritis*; both are accompanied by pelvic peritonitis.

The symptoms of perimetritis are tenderness on deep pressure at one or both sides of the uterus, with pain, fever, and increased pulse rate. The symptoms of parametritis are pain on deep pressure directly over the uterus, swelling of the abdomen, with acute pain over the womb. Parametritis soon merges into general peritonitis, in which the abdomen becomes distended, very painful; the pulse rapid and feeble; fever continually high; while great thirst, prostration, and often delirium, complete a clinical picture of gravest import. If a vaginal examination be made in perimetritis, parametritis, or general peritonitis following either, an exudate will usually be found in one or both broad ligaments,

which in some cases fixes the uterus as in a mold. Suppuration may occur in these cases, and pelvic abscess, limited by the pelvic peritoneum, which becomes inflamed and adherent, is frequently observed. Following parametritis the lymphatics of the uterine muscle become infiltrated with septic material, the muscle becomes enlarged and softened, and metritis is said to be present. The wall of a womb which is the seat of septic inflammation is much softer and more easily perforated than normally, and hence the need for caution in intra-uterine manipulation in septic cases.

Septic infection of the uterus produces first a brief cessation of the lochia, and then purulent, offensive lochia. The occurrence of the symptoms of perimetritis and parametritis, with foul lochia, leaves no room for doubt that the uterine cavity is in a septic condition. Its prompt and thorough disinfection is the imperative duty of the obstetrician.

After the vagina has been thoroughly disinfected by a copious vaginal douche of bichlorid of mercury solution, 1 to 5000, the uterus should be explored and thoroughly douched. The patient should be placed across a bed or upon a table, her hips at the edge. A gallon of creolin solution, 2 per cent., carbolic acid, 2 per cent., thymol 1 to 1000, saturated solution of boracic acid, or alcohol 1 part and water 2 parts, should be in readiness, at a temperature of 110° F. Bichlorid of mercury should not be used for intra-uterine douches on account of the danger of poisoning which attends its introduction into the uterus. As an instrument for douching the uterus, and also removing retained portions of placenta and membranes or diseased decidua, the writer has found Carl



FIG. 125.—THE DOUCHE CURETTE, FOR PUERPERAL CASES.

Braun's douche-curette of great service. This is a dull, spoon-curette upon a long, hollow handle, which may be connected with the hose of a fountain syringe. The syringe (Fig. 125) being filled with the antiseptic solution chosen for irrigation of the uterus, which is allowed to run through the curette, the curette is gently introduced, the cervix being steadied, if necessary, by grasping it and pulling upon it by a tenaculum forceps. While the antiseptic fluid continues to run, the endometrium is gently but thoroughly scraped by the curette, and thus the double purpose of an intra-uterine douche and an exploration of the uterine cavity is secured. After thorough cleansing of the uterus with the douche-curette, a suppository containing sixty grains of iodoform, or iodoform guaze is grasped by uterine dressing forceps and carried well within the uterine cavity. After the use of the curette and iodoform suppository, it is often unnecessary, and even injurious, to enter the uterine cavity again with any instrument. If the uterus is once thoroughly disinfected, and symptoms of septic infection persist, the infecting material has entered the blood and must be combated by constitutional treatment.

If, however, the physician has no douche-curette and the internal os is not firmly contracted, an ordinary glass vaginal douche tube, may be used. The stream should run freely through the tube, before it is introduced, to prevent the entrance of air, and the bag of the fountain syringe must not be higher than three feet above the patient's bed. Many intra-uterine douche tubes are in market, and have their several advocates. In common with other instruments, that which is simplest and most easily cleaned is best. We have found an intra-uterine douche tube of hard rubber, made in two pieces, of great convenience. In cases where it is difficult to enter the uterus, this tube can be bent like a pessary to any curve. Its simple construction admits of its easy dis-

infection ; the upper portion, which remains in the vagina, forms an excellent tube for washing out the fetal head after craniotomy (Fig. 126).

Whatever douche tube be used, a fountain syringe and the force of gravity is to be chosen for irrigating the uterus. The compression bulb syringe is not to be selected for this purpose, from the danger of the entrance of air and difficulty in cleansing the syringe. At least a gallon of hot antiseptic solution should be allowed to run before the tube is removed and the iodoform suppository introduced. The effect will be a powerful stimulation of uterine contraction and usually a fall in the patient's temperature. If the uterus shows a ten-

FIG. 126.



HARD RUBBER INTRA-UTERINE DOUCHE TUBE.

dency to relax, ergot or quinin may be given to advantage. Four vaginal douches of bichlorid solution, 1 to 5000, should be given in each twenty-four hours, and after a douche the iodoform suppository may be repeated, if needed. If the first disinfection has been thorough, it will rarely be necessary to repeat it, and the frequent use of intra-uterine douches is to be avoided. When foul lochia and fever persist, an intra-uterine douche may be given once daily for a few days.

In doubtful cases of fever after childbirth, it is the obstetrician's first duty to examine the patient carefully for signs of septic infection. If no other cause, as fecal retention, be found for fever, the genital tract, from the fundus uteri to the

vulva, should be thoroughly antisepticized. By so doing, sepsis is excluded, a diagnosis can be more readily made, and the patient's interests have not been jeopardized.

Following this disinfection, iodoform gauze may be used as a drain, to advantage. The uterus should be lightly tamponed, and the gauze renewed in twelve or twenty-four hours as indicated.

CHAPTER XLI.

THE CONSTITUTIONAL AND SURGICAL TREATMENT OF PUERPERAL SEPSIS.

Scarcely less important than the disinfection of the genital tract is the constitutional or general treatment of puerperal sepsis. We possess at present no antiseptic which may be introduced into a patient's blood in quantities sufficient to destroy the micrococci of sepsis, which will not destroy life, with the possible exception of alcohol. This drug, by reason of this property, and also its utility as a food, is especially adapted for use in these cases. As a rule, beverages containing a high percentage of alcohol are best borne and most advantageous. Brandy and whiskey diluted, or alcohol and water, are often tolerated when wines are refused. When wines can be taken, port and sherry are best adapted, and may be taken in quantities limited only by the patient's tolerance. It is impossible to give exact rules for the use of alcohol in sepsis. So long as the patient is not intoxicated, the breath not smelling strongly, the pulse becoming slower and stronger after administration of alcohol, it is doing good.

With the administration of alcohol goes, with equal importance, the giving of food. Milk, peptonized if needed, eggs beaten up with milk or whisky, or brandy, freshly made broths, well seasoned and served hot, are the basis of feeding. Koumyss ; rich, pure ice cream ; milk, curdled by rennet, and scraped beef may be added if craved by the patient, and well borne.

The time and manner of feeding and giving alcohol cannot be understood without reference to the antipyretic treatment of puerperal sepsis. On the various modes of lessening

fever, the application of cold is best. Antipyretic drugs (antipyrin, antifebrin, phenacetin) are of value only as nervous sedatives. Their use in doses of fifteen to twenty-five grains obscures diagnosis early in a case of puerperal sepsis, lessens the patient's strength, and impairs capacity for food and alcohol. Antipyrin in 5-grain doses, phenacetin in 5-grain doses and antifebrin in $2\frac{1}{2}$ -grain doses relieve nervous restlessness in some patients, and favor rest and sleep. They often take the place of opium for simple restlessness, without its injurious effects on digestion.

When fever rises to the point of oppressing the patient (103° , 104° , 105° F.) sponging with cold water should first be tried. Where cold water serves to depress the patient, rapid sponging with hot water, to which ammonia or alcohol has been added, may be substituted.

In either case heat is lost by evaporation from the patient's skin. If this suffices to refresh the patient, half an ounce of whisky or brandy and a small cup of milk, or broth, or an egg may be taken. It will be found that antipyretic treatment of this sort and feeding can be given to advantage at convenient intervals, from every two to every four or five hours. When sponging does not suffice, the body pack is convenient and useful. This consists in exposing the patient's trunk, from the pubes to the episternal pit. Towels are then wrung out of ice water, and laid across the body from the pubes to the neck. By the time the last one is placed, the first is warm and should be removed, wrung out and replaced. By wringing them out in rotation an efficient and convenient pack is obtained, which may be given without wetting the patient's bed. The whole pack, in a wet sheet, and the cold bath are less often needed. In parametritis and peritonitis the ice bag or better, ice-water coil, placed over the womb, is useful. The pain of abdominal and pelvic inflammation may be often relieved by turpentine stupes or by cold. When

very severe, it must be controlled by morphia and atropia hypodermically.

The treatment of peritonitis by salines is useful only in the first few days of the attack. An eliminating diarrhea is frequently observed in these cases and should not be checked unless excessive, when salicylate of bismuth in thirty grain doses will be found useful. So far as tonics are concerned, quinin in five-grain doses, with pepsin, is of advantage in greatly debilitated patients.

THE SURGICAL TREATMENT OF PUERPERAL SEPSIS is of importance, because a more extended trial of this resource may lessen the mortality of this disease. When pelvic abscess can be diagnosticated, it should be emptied and disinfected, either through the vagina or by supra-pubic incision. The symptoms of such abscess are an elastic tumor felt through the vagina beside the uterus, following septic infection, with the general symptoms of pyemia.

When a collection of pus can be diagnosticated in the peritoneum, encysted by peritoneal inflammation and adhesions, incision and drainage are indicated. Continued peritoneal inflammation; protrusion of a portion of the abdominal wall with an area of well-marked dulness, are diagnostic signs of encysted peritoneal abscess. The infected uterus whose sinuses contain pus and micrococci and whose lymph spaces are filled with bacteria should be entirely removed by the procedure known as supra-pubic hysterectomy, or total extirpation of the uterus. The utility of laparotomy when diffuse general septic peritonitis is present is still a subject of investigation, and is not proven.

In puerperal sepsis of pyemic character, abscesses may form in the serous cavities of the body including the joints, and by formation of septic thrombi and emboli in the connective tissues. Incision and drainage, with thorough antisepsis, is the only treatment.

In puerperal sepsis, infecting emboli and thrombi may be carried to any of the organs of the body. Thus an area of a lung may become infected by the lodging of an infected embolus, and septic pneumonia result. Hepatic, cerebral, and splenic abscess have a like origin. Multiple joint emboli may simulate rheumatism. Sudden blindness, followed by the rapid destruction of an eye, denotes that an embolus has reached the eye. The statements of those who do not practise antiseptic precautions in obstetrics, and deny septic mortality are explained, in part at least, when we find that such practitioners lose patients from "malaria," from "pneumonia" and "jaundice" after confinement. A better knowledge of the pathology of puerperal sepsis would have enabled them to recognize in these cases the late complications of puerperal septic infection.

CHAPTER XLII.

COMPLICATIONS OF THE PUERPERAL STATE.

In addition to septic infection, the puerperal patient is exposed to several complications which affect her recovery and the well-being of her child. The interests of both are involved in disorders of the breasts, and mastitis and engorgement of the breasts are among the most common of these disorders.

ENGORGEMENT results from sudden distention, and from neglect to support the breasts and favor the free discharge of milk. The glands become greatly enlarged, the skin over them tense and shining, the veins well marked and the axillary lymphatics enlarged and tender. Lancinating pain is felt, extending into the axillæ. A rise in temperature to 100° F., and in nervous women a sensation of chilliness may be present, but no well marked rigor occurs, and the sharp disturbance which characterizes septic infection is absent. The condition of engorgement predisposes to inflammation by causing congestion, but suppuration and septic fever do not occur unless a micrococcus finds access to the breasts through some fissure of the nipple or from the infected blood of the mother.

When pain and swelling of the breasts occur, the obstetrician's first duty is to assure himself that septic infection is not present. Simple engorgement having been diagnosed, the indications are to support and compress the breasts, to promote the free exit of fluid from them, and to promptly drain the lymphatic channels of the mother of a

considerable quantity of fluid. The complaint of pain is to be met by the application of heat or cold, whichever the patient finds most grateful.

The breasts may be conveniently supported and compressed by the breast binder, which has been described in the treatment of the normal puerperal state. By tightening or loosening the bandage and shoulder straps, and by observing that the apertures for the nipples are large enough to permit fluid to flow easily, the bandage will be of considerable service. Fluid may be removed from the engorged breasts by the breast pump, the simple bulb pump being best. The prompt use of saline laxatives will promote the subsidence of the engorgement; a teaspoonful of a saturated solution of magnesium sulphate, given every hour or half hour until free watery stools are voided, will be found useful. Over the bandage may be placed an ice-bag, or hot fomentation, as is most conducive to the patient's comfort. Her diet should be light, and fluid taken as sparingly as possible. The child may nurse at regular intervals; should symptoms of intestinal irritation appear, it may be fed for several meals until the secretion of fully formed milk is established.

MASTITIS.—Septic infection may find access to the breasts and produce inflammation and suppuration. This complication of the puerperal state commonly accompanies the development of general septic infection, the infecting material gaining access to the gland through a fissure in the nipple. Mastitis is most often seen in women with poorly developed nipples, where the efforts of the child to nurse wound the epithelial covering of the nipple, and infectious material from the vagina or the child's mouth enters through the abrasion.

Symptoms of mastitis are pain, tenderness and swelling of the gland, with lymphangitis. The lymphatics of the breast show in reddened lines, the axillary lymphatics are large and

tender, and a decided rise in pulse and temperature, with often a pronounced rigor, complete the clinical picture. Infection finding lodgment at the nipple may remain limited to the areola and tissues about the nipple, or, following the lymphatics deeper, may infect an acinus of the gland or several acini. Suppuration soon follows, and fluctuation can be detected on careful examination. In neglected cases the gland may become honeycombed by suppuration, and the pus may burrow in the axilla.

When the nipples are developed during pregnancy, the epithelium healed by ointments, and antiseptic precautions are exercised in the conduct of labor, mastitis is infrequent. When it occurs, it should be treated by the measures advised for the treatment of engorgement, with prompt incision and disinfection when pus forms. A suppurating breast is to be treated like any other abscess. The child is to be taken from the affected breast at once.

CHECKING LACTATION.—When the fetus dies and when the mother proves unable to nurse her infant, the secretion of milk must be checked, to prevent engorgement and threatened mastitis. Compression by the bandage, the application of cold, if the patient is not depressed by it, and in some cases, the use of belladonna are indicated. A convenient and comfortable way of applying belladonna consists in cutting a circular piece of surgeon's lint, with an aperture to permit the nipple to protrude, smearing belladonna ointment upon it, placing it upon the breast and applying the compressing bandage over it. The breast should be disturbed as little as possible, tension being relieved by the cautious use of the breast pump, which does not require the removal of the bandage.

Where an ointment is objectionable, a similar piece of lint may be sprinkled with a solution of atropia, four grains to the ounce, and applied in the same manner. An eruption

resembling that produced by croton oil occasionally follows the use of belladonna, but does not cause serious inconvenience.

Simple FISSURE of the NIPPLES will occasion pain when the child nurses, and, unless precautions are taken to avoid infection, soon ends in inflammation. Scrupulous cleanliness and the free use of boracic acid solution are indicated ; the nipple must be protected by a nipple shield, and the application of an ointment of equal parts of cosmolin and lanolin, with ten grains of boracic acid to the ounce, or painting with the compound tincture of benzoin, will usually result in speedy cure. In neglected cases nitrate of silver may be required.

The tardy contraction of the genital tract to nearly its former dimensions is known as SUBINVOLUTION. Septic infection and inflammation, retention of portions of the placenta and membranes, and failure in the patient's nutrition and vigor are the most common causes. When the uterus continues large, and the vaginal walls remain relaxed and engorged with blood, the physician's first duty is to ascertain that no pathological condition within the uterus is causing subinvolution. The womb should be explored with the curette and thoroughly douched with a hot antiseptic solution. An iodoform or boracic acid suppository may then be left within the uterine cavity. The vagina should be examined to see that no ulcerated surface is present. Laceration of the cervix and perineum and vagina may be closed after the first ten days of the puerperal period, and if antiseptics be practised, such operations will be attended by little or no disturbance of the patient's general condition.

The constitutional treatment of subinvolution is scarcely less important than the local treatment of the genital tract. Constipation must be avoided ; massage, judicious feeding, the administration of ergot, arsenic and nux vomica or strychnia, and oxygen are of great service. The upright

posture is to be avoided for a considerable time ; the patient can walk with less injury than when she remains standing. The avoidance of improper clothing is also of great advantage in preventing constriction of the abdomen, forcing the abdominal viscera downward, and favoring prolapse of the genital tract.

In cases in which the bowels are not properly moved during pregnancy, fecal accumulation exists to a considerable degree. Unless especial precautions be taken to empty the large intestine thoroughly soon after labor, FECAL TOXÆMIA may occur. The absence of pain or tenderness about the genital tract ; rapid pulse ; fever ($102-103^{\circ}$ F.) ; perspiration ; furred, coated tongue ; and apathy and discomfort, with loss of appetite, are the usual symptoms of this condition in the puerperal patient. After a careful examination has established the absence of septic infection, free purgation will speedily terminate the disorder. The value of copious hot rectal injections in these cases is to be kept in mind.

Fever in the puerperal patient may also follow EMOTIONAL DISTURBANCE. A diagnosis in these cases must be made by closely watching the patient and her surroundings, after a thorough physical examination has excluded septic or other acute infection and fecal intoxication. The removal of the perturbing cause, with the administration of a sedative addressed to the nervous system, will speedily end the fever.

CHAPTER XLIII.

RETENTION OF THE PLACENTA.

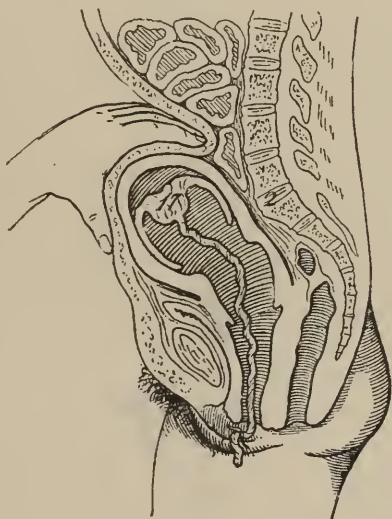
While in normal cases the placenta is expelled within half an hour after the birth of the child, it is occasionally retained. It is to be remembered that a retained and an adherent placenta are very different in pathology and indications for treatment. Simple retention of the placenta results from atony of the uterine and abdominal muscles, and usually follows exhausting, complicated labors. In women of deficient physical development, in those whose nervous systems have been greatly taxed by labor, and in cases where care has not been taken to secure good contractions of the uterine and abdominal muscles after the fetus is expelled, placental retention frequently results. When summoned to such a patient, the physician will find the relaxation produced by exhaustion, or the tetanic, irritable contraction of the uterus which follows exhaustion of the nerve centers in some cases, demanding his attention. After carefully antisepticizing the vagina and his hands, a thorough vaginal examination will inform him regarding the case.

In atony and relaxation he will find the placenta in the lower uterine segment and cervix, an edge of placental tissue often accessible to his grasp. His left hand should rub the uterus to secure tonic contraction, and placing the thumb in the center of the fundus and the flexed four fingers behind the uterus, it should be compressed downward and slightly backward. Care should be exercised that the uterus is grasped in the center and kept in the central line of the abdomen, as otherwise an enlarged ovary may be compressed,

and violent pain and shock be inflicted. The fingers in the vagina will be able to assist in bringing the placenta into the vagina, whence it can be readily delivered. This method of uterine compression and placental delivery is known as Credé's. (Fig. 127.)

Where the placenta is retained by a contracted but exhausted uterus, the condition of uterine tetanus must be first

FIG. 127.

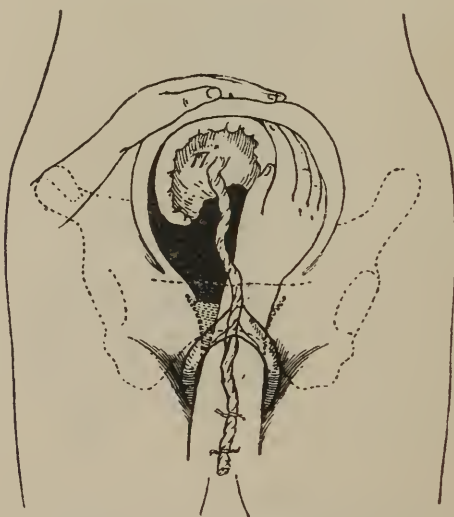


EXPRESSION OF THE PLACENTA, BY CREDE'S METHOD.

removed before the placenta can be delivered. So long as no hemorrhage occurs, the pulse remaining good and the uterus readily outlined in the abdomen, rest without interference is often all that is necessary. Under careful observation the patient may remain quiet for half an hour or an hour, when massage will often cause a normal contraction of the uterine and abdominal muscles, and the placenta will be

expelled. When the patient's condition demands the immediate removal of the placenta, an anesthetic should be given, when the condition of the tetanic contraction will yield and the placenta may be delivered by Credé's method. Chloroform is especially useful in these cases. In patients greatly prostrated by prolonged and difficult labor, the hypodermic use of morphia and atropia, and also brandy, may be indicated before anesthesia can be prudently commenced.

FIG. 128.



REMOVAL OF AN ADHERENT PLACENTA.

ADHERENCE OF THE PLACENTA AND MEMBRANES is the result of previous endometritis accompanying syphilis, gonorrhea, or endarteritis of the vessels of the endometrium of unknown origin. In these cases the usual efforts at placental expulsion are made by the patient, but the placenta remains wholly or partly adherent to the uterine wall.

This is among the most trying and dangerous of the complications of labor and the puerperal state. The indications are to remove the placenta and membranes, as the normal forces of labor cannot do so, and yet the effort to empty the uterus may result in violence and infection to the interior of the uterus. Under the most careful antiseptic precautions, with anesthesia, a gentle but patient and thorough effort must be made to introduce the fingers or the entire hand within the uterus, peel off the placenta and membranes and remove them. The finger-tips should be turned toward the center of the uterine cavity, away from the wall of the womb, to avoid wounding the endometrium, while the fingers separate the placenta as a paper-knife passes between the leaves of a book. After the removal of the placenta the uterus should be thoroughly disinfected, and an antiseptic suppository left within the cavity. (Fig. 128.)

When, however, the placenta cannot be removed without violence, the obstetrician will do well to wait until necrosis of the cellular tissue, where the placenta and uterine wall join, has occurred, when the placenta can be removed. It is of the greatest importance that the genital tract be carefully maintained in an aseptic condition during this time. Four vaginal douches of bichlorid of mercury 1 to 5000 may be given in 24 hours. The patient should wear an antiseptic occlusion dressing over the vulva. Her temperature is to be watched, and at any considerable rise the uterus must be emptied and disinfected. If infection can be prevented, in a few days the placenta will have been loosened by innocuous necrosis without suppuration. It is well to thoroughly curette the uterus after the delivery of such a placenta, to remove diseased decidua and endometrium.

CHAPTER XLIV.

DISORDERS OF THE FETAL APPENDAGES.

Among the most common of the disorders of the fetus and its appendages is DECIDUAL ENDOMETRITIS. Its cause is not clearly known, but several forms have been observed. Polypoid, diffuse or hypertrophic, cystic, and catarrhal changes in the decidua have been described. Catarrhal inflammation of the decidua may occasion confusion in diagnosis, from the fact that the discharge of a catarrhal secretion occurs during pregnancy, which may be mistaken for a discharge of amniotic fluid. When the fluid is closely observed, however, it will be found to be a mucous secretion instead of the yellowish amniotic liquid. When inflammation of the decidua persists, it not infrequently causes fetal death. It is not amenable to treatment, and the physician can only confine himself to curing endometritis when the patient is not pregnant.

ADHESION OF THE AMNION and compression of the fetal limbs is a frequent cause of malformation in the fetal members. Webbed fingers and toes are often seen as a result of this condition. Amputation of a fetal limb also follows this complication. Deficiency in the amniotic liquid (oligohydramnios) often accompanies amniotic adhesions, and malformations of the lower extremities are ascribed to this pathological condition.

Excess of amniotic fluid, POLYHYDRAMNIOS, may be diagnosed by an unusual and symmetrical distention of the abdomen, with unusual mobility of the fetus on palpation, and faint fetal heart sounds on auscultation. It is sometimes dangerous by reason of the excessive size of the abdominal

tumor and the enormously distended uterus, which may threaten rupture. Pregnancy is often interrupted by the over-distended condition of the uterus, and at labor malpositions of the fetus are caused by the sudden, free escape of an excess of fluid.

Ordinarily it is not necessary to interrupt pregnancy because of polyhydramnios, but caution should be observed at labor to avoid a malposition of the fetus and prevent precipitate labor. In excessive polyhydramnios, fluid may be cautiously withdrawn by an aspirator needle or trocar.

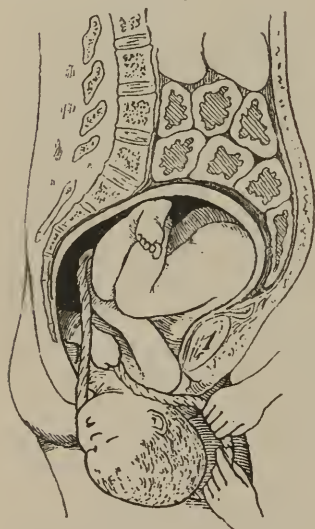
The chorionic villi which form the placenta are occasionally the seat of a myxomatous degeneration which produces a VESICULAR MOLE. When the disease occurs before the formation of the placenta, the entire chorion may become involved; when limited to the placenta, the affection occasionally destroys the placenta entirely, substituting a mass of vesicles or cysts for normal placental tissue. Symptoms of myxoma of the chorion or vesicular mole are rapid increase in the size of the abdomen, uterine hemorrhage at irregular intervals, and the discharge of grape-like cystic bodies. The death of the fetus commonly follows this condition; interference is rarely indicated except in cases where the excessive growth and bleeding of the degenerated villi threaten the patient's strength, when the uterus should be emptied.

The PLACENTA may be the seat of syphilis, producing gummata, infiltration of the perivascular spaces, with cellular proliferation occluding the vascular spaces of the placenta. A syphilitic placenta is larger, heavier and paler than normal, and islands of syphilitic tissue can be detected by their grayish-yellow color. In non-syphilitic cases endarteritis of the placenta is also observed, of unknown origin. Apoplexy of the placenta results in destroying the function of limited areas and such areas may be recognized by hematin staining, visible on inspection. Fatty and calcareous

areas are observed in placenta otherwise normal, and in cases where the fetus is normal.

The UMBILICAL CORD may be abnormally long, or deficient in length. The first condition predisposes to the formation of knots and coils about the fetus, and may lead to fetal death by asphyxia. A short cord may occasion delay in labor by preventing the descent of the fetus, and may result in premature separation of the placenta.

FIG. 129.



CORD COILED ABOUT NECK OF FETUS.

The coiled condition of the cord about the fetus may be diagnosticated in some cases by the detection of a murmur in the cord. When a sound synchronous with the fetal heart sound, and complicated by a murmur resembling a very faint cardiac murmur can be heard, a presumptive diagnosis of a cord coiled about the fetus may be made. A positive diagnosis cannot be established before labor.

When the head is born and the cord is found coiled around the neck, the endeavor should be made to slip it over the head or shoulders by loosening it with gentle traction. Failing in this, it should be ligated, and delivery hastened. The fetus is often asphyxiated in these cases.

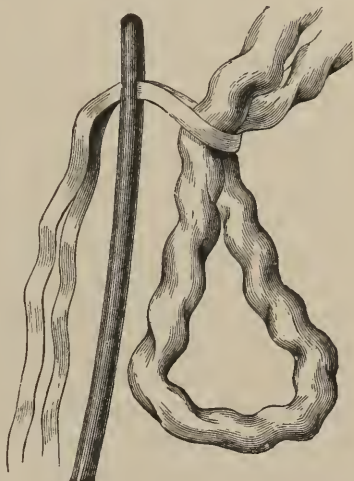
Prolapse of the cord during labor threatens the life of the fetus from compression and asphyxia. An endeavor may be made to replace a prolapsed cord by passing a double piece

of silk ligature or a string through an English catheter, bringing it out at the eye, passing it about the cord and catching the loop of ligature over the end of the catheter. By pulling upon the ligature at the end of the catheter the cord can be kept firmly grasped while the catheter and cord are passed into the uterus; then the ligature is slackened, the catheter withdrawn and the ligature slips off the end of the catheter, leaving the cord in the uterus (Fig. 130).

The most efficient treatment of prolapsed cord consists in anesthetizing the patient and placing her in the left lateral or knee-chest position. If this is impossible she may lie across a bed, with her hips at the edge and raised several feet above her shoulders.

The cord is then grasped by the antisepticized hand and carried into the uterus and placed above the fetus. If it cannot be felt to pulsate, or if it persistently prolapses when the grasp of the physician is relaxed, the child should be at once delivered by version and resuscitated if possible.

FIG. 130.

REPLACING THE CORD WITH A
CATHETER.

CHAPTER XLV.

DISORDERS OF THE FETUS.

The fetus while in the womb is subject to disease and to malformations, which may cause its destruction or complicate labor.

EXCESS OF DEVELOPMENT in the fetus occasions difficult labor and the effort to complete delivery often results in injury which may prove fatal. In performing version and extracting a large child, fracture of the clavicle not infrequently occurs. In bringing down an arm when it has become extended in breech labor the humerus is not infrequently fractured. Such, however, are rarely compound fractures, but are what are known as "green stick" fractures, in which the periosteum is not ruptured, but the fragments are retained as the pieces of a sapling are held by its thickened bark. These cases require simple retention dressings, and union without deformity usually results.

Injuries to an unusually LARGE FETAL HEAD by forceps were considered when treating of that instrument. As the surgical treatment of complicated labor becomes better known and more extensively practised, the conservative abdominal operations will render the extensive and often fatal injuries to the head caused by the irrational use of forceps to become practically unknown.

DEFICIENCY IN FETAL DEVELOPMENT, when it causes a symmetrical but undersized fetus, results in precipitate labor in vigorous women. Should a small fetus assume a complicated position, it can be most safely delivered by version, as the grasp of the forceps is not secure upon a small head.

The after treatment of ILL-DEVELOPED CHILDREN requires the exercise of great care and patience. When such infants show a persistent tendency to abnormally low temperature, they should be kept in an incubator, and removed only when necessary to obtain food or maintain cleanliness. A simple but efficient incubator may be prepared by using an ordinary large clothes-basket as a crib, and surrounding the child by bags of sand, which may be heated. If an abundance of padding be supplied and a sufficient number of sand-bags, so that some can be constantly heating while others are changed, a temperature of 100° F. can be readily maintained. More elaborate and efficient incubators are Tarnier's and Auvard's simpler form of Tarnier's, in which hot water supplies heat.

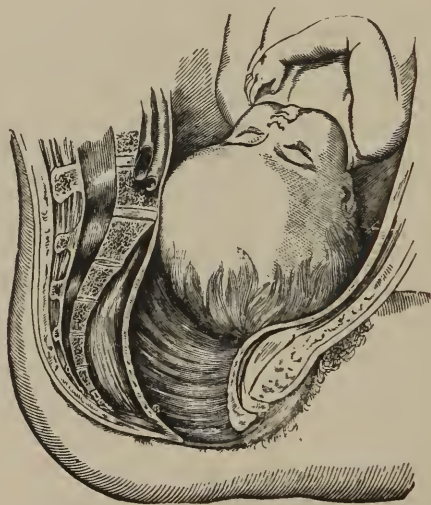
In ill-developed children who have not strength sufficient to suck the breast, it is often necessary to obtain milk by a breast-pump and feed it to the child by a spoon or medicine dropper. Milk may be introduced into the stomach by passing a small soft catheter into the stomach, attaching a funnel and pouring milk through the funnel ; this is known as gavage. By the use of the incubator and by careful feeding, the age of viability for infants has been advanced to 6½ in place of 7 months.

The presence of a TUMOR in some portion OF THE FETAL BODY may threaten fetal life and complicate labor. Such are a congenitally enlarged thyroid gland producing goiter ; enlarged spleen from malaria or sarcoma ; sacral tumors associated with defect in the walls of the spinal canal and the protrusion of the membranes and fluid ; cerebral meningocele or deficient cranial walls with protrusion of the brain and its membranes and fluids ; and hydrocephalus. In all of these cases the continuance of the child's life, even if labor be successfully accomplished, is very doubtful. Hence the mother's interest must be wholly paramount, and, before the fetus becomes impacted, embryotomy is indicated. The most

common of these conditions is that of dropsy of the cerebral ventricles, with distention of the brain and its coverings. This pathological state varies in severity from cases associated with rhachitis, in which recovery ensues, to instances of excessive distention of the brain and cranium, in which cerebral functions and even the continuance of life are impossible.

The presence of a HYDROCEPHALIC SKULL is diagnosticated

FIG. 131.



LABOR DELAYED BY HYDROCEPHALIC HEAD.

by feeling a smooth, slightly elastic tumor without bony landmarks in place of the ordinarily ossified head. Examination under anesthesia with the greater portion of the hand will confirm the absence of the sutures and fontanelles. Delayed or suspended labor results from the presence of a hydrocephalic head of considerable size. The mistake of applying the forceps to such a head must be avoided ; the grasp of the instrument would be insecure, and slipping and wounding of the

mother's tissue would result. The head must be lessened in size by evacuating a portion of the fluid. When the distention of the head is not excessive, a fine trocar may be employed, in the hope that when a portion of the fluid has been removed, labor pains may compress and expel the head. Where the head is so large that no such result can be reasonably expected, it is best to perform craniotomy, empty the

FIG. 132.



HYDROCEPHALUS AND BREECH PRESENTATION.

head of a considerable portion of the fluid, and deliver it by the cranioclast (Fig. 131).

The hydrocephalic head not infrequently lodges in the fundus of the uterus, the fetus assuming a breech presentation. In these cases craniotomy on the after-coming head is the most effective treatment. When the skull cannot be readily reached, the spinal canal may be opened and fluid drained in that manner (Fig. 132).

CHAPTER XLVI.

MONSTERS: FETAL DEATH IN UTERO.

Deficient development in various portions of the fetal body causes deformities so unnatural in appearance that such a fetus is called a monster. Single monsters (a single deformed fetus) are often the blighted one of twins, the living, normal fetus having so appropriated the tissue and pabulum of the other that but a portion of the body has developed. Monsters may be conveniently divided into those which can exist alone (autositic) and those which depend upon the placental circulation of a second fetus, so that the monster's life ceases when the umbilical cord is cut (omphalositic.)

Among the autositic monsters are the ectro-melic, with the absence of a limb; symelic, the limbs joined; celosomatic, the abdominal wall almost entirely deficient; exencephalic, the cranial bones lacking; pseudencephalic, brain and cranial bones but slightly developed; anencephalic, with brain and skull lacking; cyclocephalic, eyes fused; otocephalic, ears joined, face lacking. The omphalositics are the portions of a blighted twin, the other normally developed. They are deficient in cardiac formation (acardiac), or have no head (acephalic), or lack a trunk (asomatic), or have no well-defined shape (fetus amorphous) (Fig. 133).

Double monsters are most often joined twins, or a normal fetus, with several limbs or parts of a second fetus joined to the body of the first.

Although even double monsters are often delivered spontaneously, yet should impaction and delay in labor occur, embryotomy should be at once performed.

DIAGNOSIS AND TREATMENT OF FETAL DEATH IN UTERO.—When fetal death occurs it may be diagnosticated by the cessation of heart sounds and movements. Progressive diminution in the size of the mother's abdomen is also a symptom of

FIG. 133.



ANENCEPHALIC MONSTER.

diagnostic importance. If no interference be practised, a dead fetus is usually expelled spontaneously in less than a month after the fetal death. If retained it may become soaked in amniotic fluid and the serum of its own blood

(macerated); or shrivelled (mummified); or hardened (a lithopedion). Putrefaction will not take place unless air gains access to the fetus through rupture of the membranes.

When fetal death has been diagnosticated, labor should be induced by the insertion of a bougie. If the fetal membranes have been ruptured and putrefaction be present, dilatation must be cautiously effected, the fetus removed and the uterus disinfected.

CHAPTER XLVII.

DISEASES OF THE NEW-BORN CHILD.

Failure of oxygenation of the fetal blood is a common disorder attending labor and persisting for a few hours during the puerperal state. It is commonly known as ASPHYXIA, and is of two degrees. The first is that in which the child's color is dark red, the heart beats slowly, the mouth grasps the physician's finger, the response to counter-irritants is present, respiratory movements are present although feeble. This condition is often accompanied by cerebral compression from hemorrhages on the surface of the brain, following compression of the skull during labor. Where hemorrhage is not present, efforts at resuscitation are commonly successful.

The second stage of asphyxia is the "pallid asphyxia" of some observers. The child's body is a bluish-white; the muscles relaxed; feeble efforts at respiration or deglutition are present; a very feeble heart impulse can be observed. The eyes react but slightly to light. In these cases treatment is often unavailing.

Children suffering from diseases which make the establishment of respiration impossible through constitutional weakness, often survive labor for several hours or a day. Such children have gasping respiration; are red in color; lie in a condition of stupor; moan in an unconscious manner, and swallow nourishment with difficulty. When an autopsy is made on such a child, a condition of atelectasis is commonly found in the lungs. The portions into which air has not entered, sink in water, are dark red or violet in color, show a

smooth surface when cut, with no mucus on pressing upon the cut bronchial tubes.

The treatment of asphyxia has been already stated under the treatment of labor in breech presentation. Children who have been resuscitated from asphyxia should be kept in an incubator for several days, and require careful attention as regards the maintenance of the circulation and the promotion of nutrition. VISCERAL HEMORRHAGE is a frequent cause of infantile death after severe or protracted labor. The pressure of the uterus and pelvis, where labor pains are severe, is often so great as to cause extravasation of blood in the viscera, especially the lungs and brain. Such infants may survive for several days, although in a feeble condition, finally dying in coma without an appreciable cause. Treatment, beyond the use of stimulants and the maintenance of warmth, is unavailing. Post-mortem examination shows the characteristic lesions, sometimes in every organ in the body.

SEPTIC INFECTION IN THE NEW-BORN CHILD.—Septic infection may find lodgment in the child's body through the umbilicus or a mucous surface. Among the latter varieties of sepsis are septic inflammation of the conjunctiva, of the mouth, and in female children of the vulva. The first results in ophthalmia neonatorum.

The symptoms of ophthalmia of the new-born are redness and swelling of the lids, with a muco-purulent secretion. If allowed to go on, infiltration and sloughing of the cornea, with perforation and intra-ocular abscess, may destroy sight.

In proportion as antiseptic precautions are taken regarding the condition of the mother's genital tract before labor and the avoidance of infection during labor, ophthalmia disappears. When the gonococcus, however, is present in the vagina before labor and infects the eyes, the after-treatment is often unsuccessful. In many hospitals a drop of a 2 per cent. solution of nitrate of silver is dropped into the eyes,

after douching them with boiled water. In hospital practice this precaution gives excellent results. Where the genital tract is known to be aseptic before delivery, it is unnecessary. So soon as the disorder is recognized, if one eye only is affected, the other should be closed and protected by an antiseptic pad and bandage. The inflamed eye is then to be douched with a saturated solution of boracic acid every hour or half hour, in alternation with bichlorid of mercury solution 1 to 8 or 10,000. This is best accomplished by placing the warmed solution in a fountain syringe, using a medicine-dropper in place of the usual nozzle. The child is placed across the nurse's lap, its arms confined by a blanket, its inflamed eye lying lower than the other. While the lids are gently separated with the fingers of one hand, with the other the stream is directed from the nasal side of the lids to the outer canthus. The fluid is conducted by a rubber sheet into a receptacle and thus infection of the other eye is avoided. The eyes should never be wiped or rubbed with bits of cotton as is so often done. It is well to dilate the pupils with atropia early in the case. Where swelling and redness are excessive, compresses dipped in an iced solution of boracic acid may be kept constantly upon the lids. The occasional application of a solution of silver nitrate, 20 grs. to the ounce, is useful in severe cases, if it can be done by a thoroughly competent person. The infection of ophthalmia is very virulent, and great care must be exercised by nurses and attendants to avoid the transmission of the virus.

Umbilical sepsis is marked by redness and swelling of the umbilical tissues, with fever. Occasionally the infection passes directly through the lymphatics into the general circulation, while no local symptoms are present. Various micrococci may cause umbilical sepsis, among them the germ of erysipelas.

The mouth may be invaded by various forms of bacteria.

Most common is a fungus called the sprue fungus, which forms white patches upon the mucous membrane. It occasions considerable irritation, and may be swallowed and disturb the intestinal functions. It is best treated by allowing the child to swallow slowly a teaspoonful or half teaspoonful of solution of boracic acid, from 5 to 10 per cent. in strength, given with some palatable vehicle, several times daily. Where boracic acid is used freely in cleansing the nipple, the development of sprue (or thrush) is rare.

In diphtheritic inflammation of the vagina at labor, the diphtheritic virus may become transferred to the child's mouth, and set up a like process in the fauces.

The child may inspire septic material from the vagina during complicated labor, in which asphyxia is threatened and respiratory movements occur. Inspiration pneumonia follows, and is often fatal.

Malignant jaundice, tetanus, acute hemoglobinuria of the newborn are the results of infection by agents not yet clearly known: the results of these infections are fatal, treatment being simply palliative. Hemoglobinuria, so called by Winckel, is associated with cyanosis, jaundice and hemorrhages from various organs; the disease is almost invariably fatal. The bacillus of tetanus usually finds entrance through the umbilicus.

THE UMBILICUS may be also the seat of hemorrhage after the ligation and cutting of the cord. This may arise from fungous granulations or from a brittle condition of the blood vessels. If pressure by an antiseptic pad fails to stop such hemorrhage, two needles may be passed at right angles beneath the bleeding tissues and a figure-of-eight ligature applied.

Besides the caput succedaneum, which disappears in a few days after labor, CEPHALHEMATOMA may be present. This is a tumor formed by extravasation of blood between the peri-

osteum and cranial bones, usually situated on or near a parietal bone, and varying in size from a walnut to an apple. The blood is dark, like syrup. The tumor is not painful, and has a tense, hard edge. If the tumor be opened, the blood reaccumulates.

Cephalhematoma may also be internal, the blood being situated between the bone and internal periosteum. External cephalhematoma is rarely dangerous; when internal it is accompanied by the symptoms and dangers which mark cerebral compression.

Cephalhematoma may be left to be absorbed spontaneously, or incised, emptied and compressed. If incised it should be done six or eight days after the tumor is discovered. If antiseptic precautions be observed, incision may be practised with impunity.

THE BLOOD of the new-born infant may become so disordered that passive hemorrhage from the mucous surfaces may threaten the child's life. When the blood is very fluid and very dark in color the condition is known as *melena neonatorum*. Such disorganization of the blood is invariably fatal.

SYPHILIS and RHACHITIS are among the most important of the constitutional and deforming diseases of the fetus. The former is known by the pallid, clay-colored complexion of the fetus; the coryza which is present at birth in many cases and the pemphigoid eruption which appears a few days after birth over the whole body. If the body of such a fetus be examined, the liver and spleen are found enlarged, perhaps containing gummata. The lungs are the seat of a fibroid pneumonia; the bones exhibit a reddish-yellow streak just above the epiphyses (Fig. 134), which is caused by the proliferation and fatty degeneration of syphilitic, cellular tissue. The nostrils of such a fetus are thick; its limbs poorly developed; its tissues ill-nourished.

The rhachitic fetus has the projecting forehead, the en-

larged epiphyses of the long bones, the "beads" along the ribs where they join the sternum, the projecting sternum and spinal curvature which so often mark this disease.

Syphilis may be treated by calomel, gr. $\frac{1}{20}$ th, with soda ;

FIG. 134.



FETAL BONE, SYPHILIS, SHOWING SYPHILITIC LINE.

by inunction of mercurial ointment or the hypodermic injection of bichlorid of mercury, $\frac{1}{100}$ th of a grain in solution. Syphilitic eruptions and sores may be dusted with calomel. Cod-liver oil is indicated in both syphilis and rickets.

APPENDIX.

The following memoranda and formulæ have been found of practical interest and value :—

ANTISEPTICS.—Bichlorid of mercury is best used for cleansing the hands of the obstetrician and the external genitals of the patient. It has caused poisoning in vaginal douches, 1 to 5000. It should not be employed for intra-uterine douches, as fatal poisoning may readily follow such use. Bichlorid is usually sold in tablets. When these cannot be obtained, the following powders will be found convenient :

Bichlorid of mercury,	grs. 10
Tartaric acid,	grs. 49
Cochineal,	gr. 1

One powder dissolved in one pint of water makes a solution, 1 to 1000. When a solution of bichlorid is turbid, common salt may be added to favor complete solution. In strength of 1 to 2000 it may be used for cleansing the hands and external parts ; in 1 to 5000 to 1 in 10,000 for vaginal douches. Bichlorid solution, 1 to 1000, is useful to cleanse rubber articles. Symptoms of bichlorid poisoning are salivation, sore teeth and gums, mucous, bloody diarrhea, rapid pulse, prostration, coma, death. Treatment consists in stopping the use of the bichlorid, using a mouth wash of equal parts of potassium chlorate and boracic acid in solution, and giving opium and stimulants for the diarrhea.

CARBOLIC ACID AND CREOLIN are valuable in 2 per cent. solutions for intra-uterine douches and to cleanse metal instruments. Glycerin should be added to carbolic solutions to

insure solubility. Creolin forms a ready emulsion with water. In 30 drops to the quart of warm water it makes an excellent vesical douche in cystitis. Its odor is disagreeable to many ; it stains linen and white rubber articles ; it is very irritating to the skin of some patients. Severe pain is sometimes complained of after the use of creolin solutions 2 per cent., but inflammation rarely follows in these cases.

Carbolic acid and creolin cause smoky urine in cases of poisoning, with dysuria and toxemia, terminating in coma and death. Aside from stopping the use of the poisonous substance, but little can be done in treating these cases.

BORACIC ACID is an excellent antiseptic for use on the mother's nipple, in the child's mouth and eyes, and 60-grain suppositories within the uterus. Saturated solutions may be used, with the addition of $5\frac{1}{2}$ of glycerin to the \mathfrak{z} . In powder, boracic acid is useful as a dressing for the umbilicus, and in dusting the folds of the skin in children disposed to eczema.

THYMOL, 1 to 1000, is an excellent intra-uterine douche.

ODOFORM may be used in suppositories within the uterus in the following formula.

Iodoform	grs. 300
Gum Arabic.	
Glycerin	
Starch aa	gr. 30

In 3 suppositories, or the quantity of iodoform may be grs. 180, each suppository containing 60 grains.

Iodoform may be used to dust the umbilicus and cord ; it may be combined with bismuth subnitrate, equal parts.

DRESSINGS FOR THE UMBILICAL CORD.—Powdered salicylic acid, 1 part ; powdered starch, 5 parts ; powdered boracic acid ; iodoform and bismuth equal parts.

A mass of absorbent cotton large enough to receive the cord and cover it, is sprinkled freely with one of the above



FIRST MANIPULATION, DETERMINING THE SIZE AND POSITION OF THE UTERUS AND CONTENTS.

powders; the cord is enfolded in the cotton, turned upward and to the left of the umbilicus and the belly-band pinned over it.

The following OINTMENT will be found useful in healing SORE NIPPLES.

Powdered boracic acid, grs. 10
Cold cream, $\frac{3}{4}$ 1

Or

Powdered boracic acid, grs 10
Lanolin,
Cosmolin, aa $\frac{3}{4}$ $\frac{1}{2}$

Or powdered zinc oxid or bismuth subnitrate in the same proportion, with these bases.

DIRECTION FOR MAKING A BREAST-BINDER OR COMPRESSION BANDAGE.—It is twenty-nine inches long by eight wide; three and a half inches from either extremity, and in the center of the bandage two holes have been cut the size of a quarter of a dollar, the edges of which are carefully over-seamed to prevent the apertures from tearing out, the distance between them being the distance measured between the nipples. At the upper edge of the bandage, five inches from the end, two shoulder-straps are attached, two inches wide. The bandage is so applied that it pins over the center of the chest between the breasts, the apertures giving room for the nipples, through which the child may nurse. Some prefer a breast-binder without holes for the nipples, choosing rather to unpin the binder when the child nurses. Patients occasionally complain that the edge of the nipple hole chafes or cuts the nipple at its base. The shoulder-straps come over the shoulders and may cross in front, or be pinned without crossing, to the upper edge of the bandage after it has been fastened about the body. The purpose of this bandage is to draw the breasts upward and inward, thus relieving the pain caused by engorgement. This bandage may be made of Canton flannel or of firm muslin as desired.

THE ABDOMINAL BINDER.—A strip of hemmed muslin 12 inches wide, from 24 to 30 inches long.

LAXATIVES.—For use during pregnancy the compound licorice powder is excellent; also the compound rhubarb pill of the U. S. P. Women threatened with eclampsia do well with the compound colocynth pill.

After labor Fordyce Barker's post-partum pill is useful :

Ext. colocynth comp.,	gr. 20
Ext. hyoscyam.,	gr. 15
Pulv. aloes socot.,	gr. 10
Ext. nucis vom.,	gr. 5
Podophyllin,	
Ipecacuanha, aa	gr. 1

In 12 pills. Two may be taken at a dose.

If the tongue be furred and coated, calomel, grs. 2½, and sodium bicarbonate, grs. 10, may be taken, followed in eight or ten hours by a seidlitz powder and a copious rectal injection.

Where a free serous discharge from the intestine is desired a rectal injection composed as follows is efficient :

Glycerin,	℥ ss
Spts. terebinthin,	gtt. xxx
Magnesium sulphate (saturated solution),	℥ ij.

Where a copious hot injection is desired to remove fecal accumulation, the following is useful :

Castile soap suds,	1 quart
Castor oil,	1 ounce

to which is added the yolk of a raw egg beaten up with 1 teaspoonful spts. turpentine. The whole to be thoroughly mixed and given at 100° F., the patient lying on her left side and retaining it as long as possible.

ANESTHETICS are to be chosen in obstetric cases as follows :

Chloroform, in normal labor as an anodyne until the moment of delivery, when complete anesthesia is desired. In



SECOND MANIPULATION, DETERMINING THE POSITION OF THE FETAL BACK.

threatened uterine rupture, where uterine tetanus is present, chloroform to complete anesthesia is indicated. To relax a tightly contracted uterus to permit the removal of a retained placenta, chloroform is indicated ; for the low forceps operation and for version.

Ether is to be preferred for symphyseotomy ; Cesarean section ; amputation of the uterus ; craniotomy ; the high forceps application ; for suturing the perineum.

Bromid of ethyl and the alcohol, chloroform and ether mixture, alcohol 1, chloroform 2, ether 3, have been used, but possess no practical advantages over ether and chloroform.

DIAGNOSIS BY EXTERNAL EXAMINATION.—It is most important, before and during labor, that all possible information be gained by external examination of the patient. Internal examinations expose her to danger of infection and are far more trying. The following detailed account of such examination is that by Credé and Leopold of Dresden, published in English by Edgar, of New York.

The *external examination* is accomplished by means of inspection, auscultation, and palpation.

Inspect the whole body of the woman to ascertain whether it presents the true female conformation, whether she is properly developed, whether her gait is correct, whether her face indicates sickness, and, finally, whether her body is well or poorly nourished.

Both *breasts* should then be inspected and palpated to determine whether they are large, medium, or small, lax or compact ; whether they contain empty or full lacteal ducts and large, prominent blood-vessels ; whether the nipples are well-developed and present the changes peculiar to pregnancy ; and whether their skin is inclined to inflammation.

Then we pass to the examination of the *abdomen*. After the dress has been loosened and drawn downward and the shirt upward, here again inspection properly precedes palpation.

By inspection alone a contracted pelvis may in many cases be suspected, from the presence of a pointed and pendulous belly, a marked broadening and figure-of-eight shape of the uterus, especially in primiparæ.

Furthermore, inspection is necessary to ascertain the condition of individual parts which cannot be determined by palpation—for instance, the scar-like, glistening white or red lines of the skin of the belly or thighs—as well as lesions, wounds, tumors, ulcers, and excrescences.

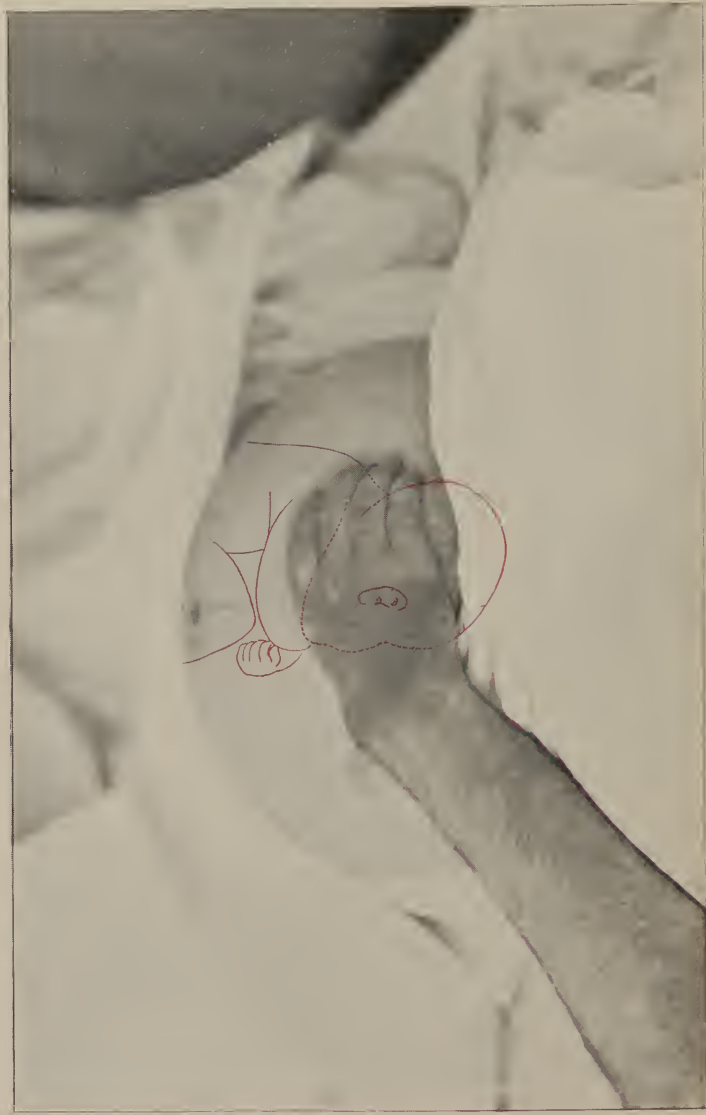
Then the body is again covered with the sheet, and the examiner warms both hands and places them flat, gently but firmly, on the abdomen in order to determine clearly its distention and circumference, the size, shape, firmness, and mobility of the uterus, and the quantity of the liquor amnii.

After that, partly by a gentle to-and-fro pressure of both hands, partly by a careful tapping, the individual parts of the fetus, their size, attitude, presentation and position, movements and mobility, are sought to be ascertained.

In order to perform this external examination accurately and thoroughly, the following well-tested four manipulations should be made use of, and in the following order: In all four of these manipulations both hands are employed at the same time, and the entire surface of the palpating palm is utilized. Should it be necessary to exert a uniform, gentle, but rather strong pressure upon the abdomen and its contents, or to map out the latter more clearly, the fingers are placed one alongside of the other; but if it be desired to press on or to grasp the individual parts of the abdominal contents with the fingers, they are spread apart as far as possible.

In the first three manipulations the examiner should seat himself at the side of the woman to be examined and facing her.

First Manipulation.—The hands approach each other at



THIRD MANIPULATION, PALPATING THE FETAL HEAD IN A PRIMIPARA.

the finger tips, then the palms of the hands are laid across the abdomen of the woman. After that the palms slide gently and uniformly upward over the entire pregnant uterus as far as the fundus, thus defining its position in relation to the navel and ensiform cartilage.

This manipulation determines at the same time whether the child lies vertical or transverse, whether the head or breech lies in the fundus, the size of the child, and how far the pregnancy has advanced. (Plate 12.)

Second Manipulation.—Both extended hands move from the ensiform cartilage to the sides of the abdomen and are laid flat one on each side of the uterus. One hand will feel the small parts, the other the long, large cylinder which corresponds to the child's back.

In this manipulation the finding of the child's back is facilitated by placing one hand flat on the median line of the abdomen and pressing the uterus gently backward. Thereby the liquor amnii is pressed toward one side, and the child's back toward the other, nearer to the abdominal walls, which can thus be felt very easily with the other hand. (Plate 13.)

Third Manipulation.—The right or left hand spreads its fingers as wide apart as possible, and with the thumb and tip of the middle finger seizes the presenting part of the child just above the pelvic inlet.

In order to be able to properly seize the head already engaged in the pelvic inlet in primiparæ, it should be sought in the direction of the pelvic cavity with the tips of the thumb and middle finger. (Plate 14.)

In multiparæ the hand and finger tips are held more horizontally in order to seize the head, which now stands higher in the uterus. (Plate 15.)

For facilitating this manipulation, in multiparæ especially, the other hand, lying upon the fundus of the uterus, presses against the presenting part of the child. If the presenting

part is hard and round, it can only be the head, which feels like a hard ball and may be moved hither and thither. The breech appears much softer and more uneven.

If the presenting head or breech is felt uncommonly covered, indistinct, and somewhat softer than usual, the suspicion is justified that the placenta lies in the lower uterine segment.

If no presenting part can be detected, the head should be sought in the side of the uterus. This effort will usually succeed if the uterus is gently palpated with short strokes of the fingers of one hand. The head will then make short jerking movements.

The third manipulation is of great value in all cases where the presenting part, head or breech, remains either in or above the pelvic inlet. If, however—as often occurs in primiparæ during the last few weeks of pregnancy or in the course of labor—the presenting part is found already in the cavity or outlet of the pelvis, then the

Fourth Manipulation is of importance. In this it is best for the examiner to stand *at the side of the bed*, his back turned toward the face of the parturient.

The finger tips of both hands now enter slowly and gently from above along the sides of the pelvis into its cavity.

Should the tension of the abdominal walls render this manipulation difficult, it may be greatly facilitated by causing the parturient to draw her thighs somewhat upward, to place her heels together, and to separate her knees.

When the head is low, one feels distinctly that a hard, round part of the child fully occupies the pelvis, and the more prominent forehead on one side can be readily distinguished from the less prominent nape of the neck on the opposite side. (Plate 16.)

These four external manipulations may be combined in many ways with great advantage.

Next the *pelvis* is to be examined externally. For this



THIRD MANIPULATION, PALPATING THE FETAL HEAD IN A MULTIPARA.

purpose the finger tips of both hands are advanced from both sides into the sacral region of the pregnant woman, there to examine the curves (?) and width of the sacrum, as well as the direction and mobility of the coccyx, in order to determine thereby the inclination and *curvature* of the pelvis. From here the hands are moved along the crests of the ilia forward to the iliac spines, whose distance from each other indicates the transverse diameter of the pelvis.

If the outstretched thumb and little finger of one hand can touch both anterior iliac spines, then the pelvis is considerably contracted.

After this the width, the arching, and the direction of the pubic bones are to be observed, and finally the legs—whether they are straight or crooked, edematous or varicose.

Auscultation demands perfect quiet.

The examiner, in the most unconstrained position possible, kneeling or bending over the parturient, who should lie straight, places his ear, or, better still, his stethoscope, firmly against the abdomen (covered with a clean towel), over various parts of the uterus.

The murmurs heard proceed either from the fetus or from the body of the pregnant woman herself.

The murmurs proceeding from the fetus are :—

1. The heart-sounds of the fetus.
2. The murmur caused by the movements of the fetus ; or,
3. That arising from the umbilical cord.

The *heart-sounds of the fetus* are heard, as a rule, most distinctly at the point where the back of the fetus touches the uterine wall. They resemble the ticking of a watch and beat from 130 to 140 times a minute, hence nearly twice as frequently as the heart of a healthy adult man.

Whenever the fetus moves, its heart beats somewhat faster.

In order to find the heart-sounds more readily and to hear them more distinctly, it is recommended to crowd the dorsal surface of the fetus, by means of the palm of the hand, from

the side opposite to the back, as strongly as possible against the anterior abdominal wall, and then to apply the ear.

The sound caused by the *movements of the fetus* resembles a gentle tapping, such as a light knock at the door, and it is to be heard especially at the point where the feet of the fetus lie; for it is the striking of the feet against the uterine wall that causes this sound.

The umbilical murmur is a faint blowing sound of the same frequency as the heart-sounds of the fetus. It occurs when the umbilical cord is wound about some portion of the fetus and thus exposed to slight pressure. It is heard but rarely, and then usually at the side where the back of the fetus lies.

Of less importance, and easily recognized, are the sounds proceeding from the body of the woman herself, which are:—

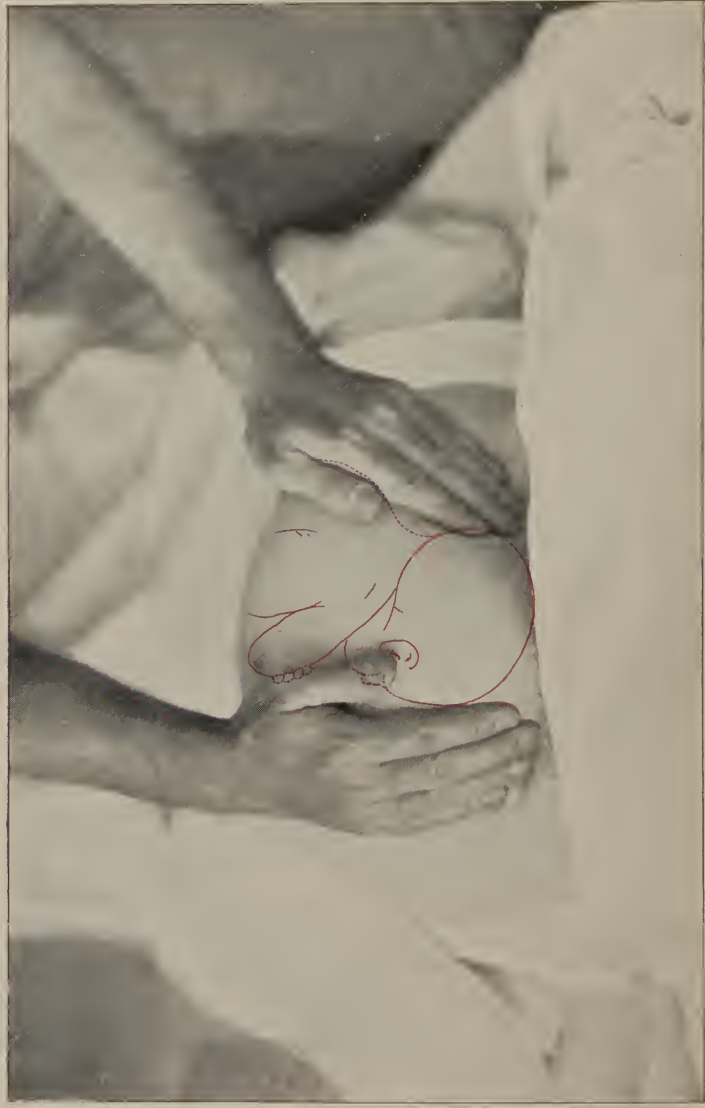
1. The *murmur of the great blood-vessels of the uterus*, caused by the circulation. It is an irregular, now stronger, again a fainter buzzing or humming, synchronous with the pulse at the wrist of the pregnant woman.

It is usually heard on one or both sides of the lower part of the uterus, if the great arteries of this region are pressed upon. Very often it cannot be heard at all.

2. The *pulsation of the great arteries in the abdomen of the pregnant woman*, a regular, dull beating, synchronous with the pulse of the wrist of the woman. It is likewise not always present.

3. The *sounds in the intestines of the pregnant woman*, a cooing or hissing, caused by the accumulation of gas in the intestinal canal.

The external examination, always best undertaken in the intervals between the contractions, must naturally often be repeated during the course of labor. For it informs us whether the descent of the presenting part into the pelvis corresponds with the strength and frequency of the pains; it demonstrates any excessive distention of the bladder, and calls attention to dangerous conditions, such as the constriction of the uterus,



FOURTH MANIPULATION, DETERMINING THE ENGAGEMENT OF THE FETAL HEAD.

gradually ascending upon its body, after long, violent uterine action ; or the painful, excessive tension of the round ligaments, which can be felt as thick, sensitive cords on both sides of the bladder, even in the intervals between the pains.

THE DIAGNOSIS OF CONTRACTED PELVIS.—The following measurements are to be made :

Between the ant. sup. spines of the ilia.

Between the crests of the ilia.

The external conjugate, from beneath the spine of the last lumbar vertebra to the pubic joint, anterior aspect.

The internal, true conjugate, from the sacral promontory to the posterior surface of the pubic joint.

Between the tuberosities of the ischia.

From the post. sup. spine of the ilium of one side to the ant. sup. spine of the other.

The following clinical data are given by Dührssen, as indicating the presence of pelvic deformity :

Small stature.

Curved and prominent extremities.

Pendulous abdomen during a first pregnancy.

History of previous difficult labor.

Complicated labor.

Premature rupture of the membranes.

Prolapse of the cord or fetal limbs.

Failure of the head to enter the pelvis.

Abnormal position and presentation of the child.

The various presentations of the head in contracted pelves are : In flat pelvis, the anterior fontanelle sinks deeply, a parietal bone presenting ; in symmetrically-contracted pelves, the posterior fontanelle and vertex sink deeply ; in flat, rhachitic pelves, presentation of parietal bone and deep position of the smaller fontanelle. These various positions are those most favorable in the respective kinds of contracted pelves.

CONTENTS OF BABY BASKET.—This basket should include the baby's toilet articles: simple rice powder, a little pot of white vaseline or cold cream, white Castile or spermaceti soap, and such other articles as an experienced nurse or mother may deem necessary. We append a list of an outfit which has been found of practical use: brush and comb; skein of white twisted embroidery silk; soft fine sponge; bottle of white vaseline; sharp pair of pointed scissors; powder-box and puff, with talc powder; pin-cushion; small and large safety-pins; pure castile soap; pair of socks; some old, fine linen; flannel or knitted band; flannel shirt, a petticoat and night-gown for infant; an afghan or piece of extra flannel, in which to wrap child; also piece of flannel, or old blanket, to receive it in; in addition the baby will require eight day dresses, eight night gowns, eight white skirts, four day flannel skirts, four night flannel skirts, four pairs of day socks, four pairs of night socks, six flannel shirts, six flannel bands, three dozen small soft linen diapers, three dozen larger cotton ones, at least two little knitted sacques.

The following description of A CROCHETTED BABY-BAND is taken from "Babyhood," Vol. III., p. 33: "Single zephyr in ridge stitch; that is, half stitch, in which, going back and forth, only the back half of the stitches in the lower row are picked up. Begin on a chain of fifty and crochet forty-eight ridges, hence ninety-six rows. Join by a row of plain stitches, and at top by a picot edging (five chains and a tight stitch back into the first)."

INFANTILE COLIC.—Prevented by proper diet of mother and systematic nursing of infant.

Relieved by peppermint water, gtt. x-xv, in a little sweetened hot water. If constipation exists, it can usually be relieved by sodii phosphas, gr. v-x, three times daily, given in hot water.

A spice plaster, or hot flannel over the abdomen, is also useful.

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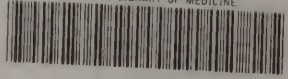
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